

1-2024

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### Recommended Citation

Rachael E. Salcido, Banning Plastic, 2024 ULR 57 (2024)

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# BANNING PLASTIC

Rachael E. Salcido\*

## *Abstract*

*The disgusting nature of plastic pollution has finally captured the attention of policymakers and driven legal change. Local, state, and national bans on various plastic consumer items coupled with voluntary industry switching creates momentum toward a full-scale end to unnecessary plastic products. Bans have the capacity to create an important tipping point. This Article extolls the effectiveness of consumer bans and explores the challenges to achieving this highest level of environmental control. Plastic is essentially pure petroleum.<sup>1</sup> Its persistence and destructiveness in the environment presents unique reasons to eliminate its use altogether. Plastics should only be used for essential products for which we have no replacements. The evidence is clear that banning single-use plastic products achieves environmental protection with negligible impact on consumers. The harm caused along the full lifecycle of plastic requires an appropriate regulatory response. This Article argues for a ban of non-essential plastics to address the scope and scale of plastic pollution facing the world today.*

## INTRODUCTION

Plastic is cheap and easy to use in many applications. As a result, plastic use has exploded from 15 million tons in the 1960s to 311 million tons in 2014, and is ever increasing.<sup>2</sup> Although the market dynamics are changing based on government responses and consumer demand, because plastic is made from fossil fuels, plastic production is poised to “drive much of the future growth in the entire oil industry.”<sup>3</sup> Proposing various solutions to the problems posed by plastics, a group of researchers

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<sup>1</sup> *Controlling and Reducing Pollution from Plastic Waste: Hearings on S. 559, S. 560, and S. 633 Before the S. Subcomm. on Env't Prot. of the S. Comm. on Env't and Pub. Works*, 100th Cong. 29 (1987) (statement of Margaret Rogers, Congressional Liaison, Society of the Plastics Industry) (stating “[a]s you probably know, plastics are basically pure petroleum.”).

<sup>2</sup> ELLEN MACARTHUR FOUND. AND MCKINSEY & CO., *WORLD ECON. F., THE NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS* 17 (2016), <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics> [<https://perma.cc/3N5B-AZLD>].

<sup>3</sup> *What Is the Future for Plastics?*, S&P GLOBAL (Feb. 24, 2020), <https://www.spglobal.com/en/research-insights/articles/what-is-the-future-for-plastics> [<https://perma.cc/U5GX-YJUE>]; see generally INT'L ENERGY AGENCY, *THE FUTURE OF PETROCHEMICALS: TOWARDS MORE SUSTAINABLE PLASTICS AND FERTILISERS* (2018).

in 2009 raised alarms that “the quantity of plastic produced in the first 10 years of the current century is likely to approach the quantity produced in the entire century that preceded.”<sup>4</sup> Another source lamented that we are on the precipice of another “surge” of plastic production, as the oil industry seeks a way to monetize the hydraulic fracturing oil surplus.<sup>5</sup> If plastics were an innocuous material, this insight would not be so disturbing. Indeed, at one point in history, the benefits of plastic were extolled throughout the developed and developing world as their production represented an opportunity to reduce extraction of other environmental resources. Yet, now, the dangers of plastic—from production, use, and marine debris—are in the spotlight as policymakers debate workable solutions to the problems caused by plastic use.

It helps to understand the issue of plastic pollution by analyzing it through the lens of the ‘Wicked Problems’ framework developed by theorists Horst Rittel and Melvin Webber.<sup>6</sup> Wicked problems are those that are difficult to define, “unstructured, cross-cutting, and relentless.”<sup>7</sup> Plastic pollution is a wicked problem because the sources of plastic pollution are numerous given its ubiquity in all sectors of consumer products. Moreover, plastics persist in the environment for hundreds of years, and harm from plastics occurs all along its lifecycle.<sup>8</sup> As larger pieces of

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<sup>4</sup> Richard C. Thompson, Charles J. Moore, Frederick S. vom Saal, & Shanna H. Swan, *Plastics, the Environment and Human Health: Current Consensus and Future Trends*, 364 PHIL. TRANSACTIONS ROYAL SOC’Y. 2153, 2153 (2009).

<sup>5</sup> See Beth Gardiner, *The Plastics Pipeline: A Surge of New Production Is on the Way*, YALE ENV’T 360 (Dec. 19, 2019), <https://e360.yale.edu/features/the-plastics-pipeline-a-surge-of-new-production-is-on-the-way> [<https://perma.cc/PJ62-X9QG>]; see also Michael Corkery & Somini Sengupta, *Here Is Who’s Behind the Global Surge in Single-Use Plastic*, N.Y. TIMES (May 18, 2021), <https://www.nytimes.com/2021/05/18/climate/single-use-plastic.html> [<https://perma.cc/K8YH-A8M6>] (identifying that ExxonMobil and Dow lead as the producers of plastic polymers).

<sup>6</sup> The term wicked problems originated from design theorists Horst Rittel and Melvin Webber. Their framework identified characteristics of inherently unsolvable problems. See generally Horst W.J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 POL’Y SCI. 155 (1973). Plastics are an example of a wicked problem. Jess Howard, *How Do You Solve a Wicked Problem like Plastics?*, GALAPAGOS CONSERVATION TR. (Feb. 21, 2022), <https://galapagosconservation.org.uk/how-do-you-solve-a-wicked-problem-like-plastics/> [<https://perma.cc/5Y9Q-T4NH>].

<sup>7</sup> Michele M. McGowan, DBA & Donovan D. Branche, *Developing a Social Marketing Plan to Address Wicked Problems: A Tool for Transforming Learning*, 36 J. HEALTH ADMIN. EDUC. 373, 373–74 (2020).

<sup>8</sup> Patricia Corcoran, Charles J. Moore & Kelly Jazvac, *An Anthropogenic Marker Horizon in the Future Rock Record*, 24 GSA TODAY 4, 4 (2014) (noting that plastics degrade slowly and have been estimated to be in the range of hundreds to thousands of years, potentially impacted by the climate where the material is located). Another term coined for the persistence and ubiquity of plastic making its mark on geology is “the Plasticine.” See Christina Reed, *Dawn of the Plasticine Age*, 225 NEW SCIENTIST, no. 3006, 2015 (noting that substantial amounts of plastic are not recycled and instead disposed into the environment);

plastic break down into ever-smaller pieces, beaches around the world will be covered in a thin layer of this synthetic garbage. Birds, fish, marine mammals, and other marine life mistake plastic for food, leading to significant suffering and increasing mortality rates among different species such as whales and sea turtles.<sup>9</sup> Humans are impacted by direct exposure to chemicals leaching from plastic consumer products, consumption of fish filled with plastic, and from consumption through domestic drinking water supplies.<sup>10</sup> Plastic is being drawn into the clouds and transported miles away, falling on mountaintops far from the five large gyres of waste plastic in the oceans.<sup>11</sup> And the pollution problem is only growing: scientists predict that by 2050 there will be more plastic by weight in the ocean than fish.<sup>12</sup>

Yet it is possible the most *wicked* aspect of plastic management today is that the burden of addressing its environmental harm has been foisted on developing nations and individuals—those least capable of addressing the scope of this growing

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Abhijit Prabhu, Jenny Davis-Peccoud, Jean-Charles van den Branden, & Gerry Mattios, *Solving the Consumer Plastics Puzzle*, BAIN & CO. (Apr. 6, 2020), <https://www.bain.com/insights/solving-the-consumer-plastics-puzzle> [<https://perma.cc/AFT9-GJ5N>] (“Packing and consumer products make up 59% of global plastic waste.”).

<sup>9</sup> See José G.B. Derraik, *The Pollution of the Marine Environment by Plastic Debris: A Review*, 44 MARINE POLLUTION BULL. 842, 844 (2002).

<sup>10</sup> See Thompson et al., *supra* note 4. The Department of the Interior will end the sale of single-use plastic items by 2032, citing harm to oceans, the nation’s ecosystems, wildlife, human health, threats to food safety, tourism, and contribution to climate change. U.S. DEP’T. OF INTERIOR, ORDER NO. 3407, DEPARTMENT-WIDE APPROACH TO REDUCING PLASTIC POLLUTION (June 8, 2022).

<sup>11</sup> See Steve Allen, Deonie Allen, Vernon R. Phoenix, Gaël Le Roux, Pilar Durántez Jiménez, Anaëlle Simonneau, Stéphane Binet & Dildier Galop, *Atmospheric Transport and Deposition of Microplastics in a Remote Mountain Catchment*, 12 NATURE GEOSCIENCE 339 (2019); *What Is a Gyre*, NAT’L OCEAN SERV. (Jan. 20, 2023), <https://oceanservice.noaa.gov/facts/gyre.html> [<https://perma.cc/SXD9-UUK9>]; see also Stephen Leahy, *Microplastics Are Raining Down from the Sky*, NAT’L GEOGRAPHIC (Apr. 15, 2019), <https://www.nationalgeographic.com/environment/article/microplastics-pollution-falls-from-air-even-mountains> [<https://perma.cc/HY5J-LEK3>]. The global transport of plastic waste is causing some social justice experts to criticize plastic pollution as an extended version of colonization, or “waste colonialism.” See Max Liboiron, *How Plastic Is a Function of Colonialism*, TEEN VOGUE (Dec. 21, 2018), <https://www.teenvogue.com/story/how-plastic-is-a-function-of-colonialism> [<http://perma.cc/5DU9-ZGQ9>]. For example, the Arctic community of Nain does not produce plastic but experiences waste plastic. *Id.*

<sup>12</sup> Sarah Kaplan, *By 2050, There Will Be More Plastic than Fish in the World’s Oceans, Study Says*, WASH. POST (Jan. 20, 2016, 3:48 AM), <https://www.washingtonpost.com/news/morning-mix/wp/2016/01/20/by-2050-there-will-be-more-plastic-than-fish-in-the-worlds-oceans-study-says/> [<https://perma.cc/G4TN-8S3Q>]; see also ELLEN MACARTHUR FOUNDATION et al., *supra* note 2; see also GLOB. OCEAN COMM’N, FROM DECLINE TO RECOVERY, A RESCUE PACKAGE FOR THE GLOBAL OCEAN, REPORT SUMMARY (2014) (recommending ending overfishing and to curb plastics from entering oceans).

problem.<sup>13</sup> As of 2015, less than ten percent of all plastic created since 1950 has been recycled.<sup>14</sup> Massive volumes of it end up discarded in our oceans and rivers—a consequence termed “leakage.” Plastic producers have effectively curtailed strong regulation by pointing to consumer demand—this, among other effective tactics such as disputing the harm plastic produces; deflecting responsibility for waste management; and decrying “nanny state” responses such as mandates, fees, and bans on single-use plastic products. As one reporter commented, “People in aggregate haven’t demonstrated a real ability to reduce their demand for plastic, and new regulations haven’t changed that.”<sup>15</sup> This focus on the consumer to stem the tide of single-use plastic is misguided and dangerous. It is incumbent to address the broader framework that produces new plastic. Downstream regulation of end consumer users is incredibly inefficient and has been proven ineffective. Closing the tap and cutting-off pollution at its source is far more effective.<sup>16</sup> The International Energy Agency emphasized that “[w]ithout ambitious action being taken globally, particularly in regions in which plastic demand is growing rapidly, current trends of plastic leakage are unlikely even to slow, let alone reverse.”<sup>17</sup>

As J.B. Ruhl and James Salzman discuss in *A Guide for Whittling Away*, the nature of an environmental problem as “wicked” may not necessitate any different standpoint on how to address the problem from a response perspective.<sup>18</sup> Indeed, they conclude that “policy models that work well at small scales can be confidently ‘upscaled’ without loss of reliability in guiding policy design.”<sup>19</sup> From small-scale

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<sup>13</sup> Among other dictionary definitions, wicked means “morally very bad” and “causing or likely to cause harm, distress, or trouble.” *Wicked*, MERRIAM-WEBSTER.COM, <https://www.merriam-webster.com/dictionary/wicked> [<https://perma.cc/KY4K-7ZF4>] (last visited July 21, 2023); Joseph Winters, *Rich Countries Are Illegally Exporting Plastic Trash to Poor Countries, Data Suggests*, INVESTIGATE W. (Apr. 18, 2022), <https://www.invw.org/2022/04/18/rich-countries-are-illegally-exporting-plastic-trash-to-poor-countriesdata-suggests/#:~:text=When%20plastic%20waste%20is%20shipped,communities%20and%20the%20food%20chain> [<https://perma.cc/7LLS-S2B4>].

<sup>14</sup> Roland Geyer, Jenna R. Jambeck & Kara Lavender Law, *Production, Use, and Fate of All Plastics Ever Made*, 17 SCI. ADVANCES, no. 7, 2017, at 2–3.

<sup>15</sup> Polly Mosendz, *This Plastic Mega-Factory Is a \$10 Billion Bet on a Single-Use Future: A World Leader in Virgin Resins Comes to Louisiana’s Cancer Alley with an Unlimited Vision for Its Products*, BLOOMBERG (June 22, 2020, 10:32 AM), <https://www.bloomberg.com/news/features/2020-06-08/formosa-plastics-new-factory-is-a-big-bet-on-a-single-use-future> [<https://perma.cc/452V-6W92>].

<sup>16</sup> WILLIAM H. RODGERS & ELIZABETH BURLSON, 4 ENVIRONMENTAL LAW 398 (2d ed. 2021) (noting that as with many environmental issues stopping pollution at source is most effective).

<sup>17</sup> INT’L ENERGY AGENCY, *supra* note 3, at 88.

<sup>18</sup> See J.B. Ruhl & James Salzman, *Climate Change, Dead Zones, and Massive Problems in the Administrative State: A Guide for Whittling Away*, 98 CALIF. L. REV. 59, 72–73 (2010) (noting that many policy problems seem massive yet may be perceived as just “bigger versions of smaller problems”).

<sup>19</sup> See *id.* at 73. However, for this logic to apply, the larger problem must have similar “causal properties” to the smaller problem, among other things. See *id.* at 72–73.

to more sweeping efforts, bans on a number of plastic products are emerging as a swift, implementable solution to the growing plastic pollution crisis where other types of regulation has failed. While some criticize the blunt nature of bans from a governance perspective, this Article posits bans are anything but unrefined. Bans form an important platform from which a pivot to more sustainable material usage can emerge. And they are just the right policy prescription at this moment in our understanding of the harms wrought by plastic on human and environmental health, the limited utility of alternative models of regulation, and the legacy pollution that plastic is creating in our oceans.

Production of single-use disposable plastic was a deliberate profit maximizing strategy.<sup>20</sup> It has had disastrous impacts that policymakers are now scrambling to contend with. In the midst of this scramble and delay, the plastics industry is playing a game of chicken. The industry is betting that continued consumer demand will be enough to support the massive industry investments in infrastructure being made today regardless of the potential for government regulation to strand single-use plastic production assets.<sup>21</sup> But plastic bans, in their various forms, are gaining ground and have the capacity to tip the scale toward broader curtailment and elimination of plastic pollution.<sup>22</sup>

Policymakers, advocates, and the general public have awakened to our plastic crisis. The industry has neither taken responsibility for the existing waste problem nor has it established a way out of its disastrous trajectory. Addressing plastic pollution has reached international importance, with policymakers today advocating an interdisciplinary, international governance regime to fully address the problem. This is particularly true for marine pollution where multiple nations share governing responsibilities.<sup>23</sup> It is clear that the solutions will not emerge from any one

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<sup>20</sup> See generally MAX LIBOIRON, POLLUTION IS COLONIALISM 1 (Lisl Hampton ed., 2021). Although plastic was discovered far earlier, the launch of the disposability of plastics began in the 1950s, when a call for the plastic industry to consider how disposable plastic would create constant demand for new plastic and therefore increase profits. See *id.* at 1–2.

<sup>21</sup> See Mosendz, *supra* note 15.

<sup>22</sup> Banning plastic is more politically feasible than it is currently given credit for, as discussed *infra* Part III. The engagement of strong lobbying efforts against plastic bag bans has been perceived as a recognition of this political reality. See generally Jennie R. Romer & Shanna Foley, *A Wolf in Sheep's Clothing: The Plastics Industry's "Public Interest" Role in Legislation and Litigation of Plastic Bag Laws in California*, 5 GOLDEN GATE U. ENV'T L.J. 377, 378 (2012) ("The seriousness with which the plastics industry is taking environmentalists['] attempts to restrict plastic bags demonstrates that this is a 'tipping point' issue for the plastics industry, and the battle is far from over.").

<sup>23</sup> See Joanna Vince & Peter Stoett, *From Problem to Crisis to Interdisciplinary Solutions: Plastic Marine Debris*, 96 MARINE POL'Y 200, 200 (2018) (proposing new governance mechanism to tackle marine plastic debris: "there is widespread recognition that an emergency situation coexists with a wicked problem, often a collective action problem that no one actor or institution can solve on its own[.]"). Ultimately, the authors note that more research and response is necessary to address "what we have, stupidly enough, allowed to turn from a collective action problem to a global crisis interlocked with other planetary threats." *Id.* at 203.

institution and must engage multiple jurisdictions and actors.<sup>24</sup> The second U.N. Environment Assembly adopted Resolution 2/11 which encouraged raising awareness of the problem, promoting changed corporate and individual behavior, and cooperation for cleanup of marine plastic debris.<sup>25</sup> A U.N. Environmental Assembly Ministerial Declaration in 2017 also supports this multi-pronged approach.<sup>26</sup> However, negotiators initially rejected a stronger approach which proposed targets for reduction of plastic production. While environmental advocates are pressing for bolder action, including a new international treaty specifically targeting plastic pollution along its full lifecycle, it is clear that an important component is reduction aims to tackle the scope and scale of the plastic pollution problem.

Governments should ban the use of non-essential plastics. Such bans, while effective in waste recipient nations, are critical in nations which use the greatest volume of plastic. Banning non-essential plastics is the boldest and most direct response to plastic pollution, and has been gaining in prominence, although is still under-utilized. Ten items account for seventy-five percent of plastic pollution in our ocean, and the top four are avoidable plastic take-out items.<sup>27</sup> Consumer nations, such as the U.S., create the greatest potential for transport of plastic waste into the environment, and therefore must be a part of the overall efforts to avoid plastic Armageddon.

This Article outlines the impacts of plastic on human health and the environment in Part I. Part II explains the constraints to adopting bold policy prescriptions such as a national ban on single-use plastics within the broader context of environmental law, while building the case that bans should be perceived as a complementary policy tool rather than simply the end of a regulatory spectrum. Part III examines specific plastic bans adopted by local and state legislatures in the U.S. and introduces the current contested legal landscape where *bans on* plastic bans have proliferated. Part IV examines other important bans in environmental law that addressed harmful human impacts and emphasizes the lessons from those efforts for instrument choice and design in tackling the plastic pollution problem. Part V evaluates the future of plastic regulation and its relationship to international efforts.

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<sup>24</sup> See *id.* at 200 (noting that plastic pollution is a problem that “no one actor or institution can solve on its own.”).

<sup>25</sup> United Nations Environment Programme Res. 2/11, Marine Plastic Litter and Microplastics, U.N. Doc. UNEP/EA.2/Res.11 (Aug. 4, 2016).

<sup>26</sup> See United Nations Environment Programme, Ministerial Declaration of the United Nations Environment Assembly at its Third Session Towards a Pollution-Free Planet, U.N. Doc. UNEP/EA.3/HLS1 (Feb. 22, 2018) (“We . . . having gathered . . . to work towards a pollution-free planet together with political, scientific, private sector and civil society leaders, believe that every one of us should be able to live in a clean environment.”).

<sup>27</sup> Carmen Morales-Caselles, Josué Viejo, Elisa Marti, Daniel González-Fernández, Hannah Pragnell-Raasch, J. Ignacio González-Gordillo, Enrique Montero, Gonzalo M. Arroyo, Georg Hanke, Vanessa S. Salvo et al., *An Inshore-Offshore Sorting System Revealed from Global Classification of Ocean Litter*, 4 NATURE SUSTAINABILITY 484, 485 (2021).

Finally, the Article concludes by emphasizing the urgency to ban single-use plastic in the U.S. as one step toward eliminating unnecessary plastic.

#### I. IMPACTS OF PLASTIC ON HUMAN HEALTH AND THE ENVIRONMENT

The sentimental image one conjures of a plastic “rubber” ducky is a far cry from the knowledge we have about the risk plastics pose and the harm sustained by humans, environment, and wildlife today.<sup>28</sup> Human health and the quality of the environment are impacted by plastic from the moment we drill for the raw fossil fuels necessary to create new plastic products. The chemical factories that produce plastic components emit cancer-causing pollution, which acutely impact nearby residents. More systemically, chemicals in plastic have been found to negatively impact human health—particularly phthalates and bisphenols, two types of endocrine disruptors that can cause cancer and reproductive dysfunctions.<sup>29</sup> As it enters the marine debris stage, plastic has a concentrated impact as persistent organic pollutants accumulate in fish and wildlife, often later ingested by humans. Uncertainty about long term impacts persists. Recent research concluded that sperm counts have been harmed by exposure to plastic products—a threat to the very reproductive capacity of humans.<sup>30</sup> Finally, all fossil fuel production also contributes

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<sup>28</sup> In 1992, approximately 28,000 rubber ducks spilled from a cargo ship on its way from China to the United States. See Patrick Knox, *Moby Duck Blue Planet II Reveals How 28,000 Rubber Ducks Lost at Sea 25 Years Ago Are Still Washing Ashore Around the Globe Today*, THE SUN (Nov. 21, 2017, 12:10 PM), <https://www.thesun.co.uk/news/4963360/blue-planet-ii-28000-rubber-ducks-lost-sea-25-years-ago-still-washing-ashore/> [<https://perma.cc/5LDK-59AD>]. The spill provided valuable information about ocean currents and the trajectory of plastic marine debris, which educators continue to use to teach about the plastic pollution problem. See Jonathan Leibovic, *Follow the Friendly Floatees*, NAT’L GEOGRAPHIC, <https://www.nationalgeographic.org/activity/follow-friendly-floatees/> [<https://perma.cc/77ZF-WS7E>] (last visited July 25, 2023).

<sup>29</sup> See generally Maricel V. Maffini, Beverly S. Rubin, Carlos Sonnenschein, & Ana M. Soto, *Endocrine Disruptors and Reproductive Health: The Case of Bisphenol-A*, 254 MOLECULAR & CELLULAR ENDOCRINOLOGY 179, 179 (2006) (discussing difficulty assessing impact of endocrine disruptors on human health, multiple pathways of exposure, and controversy over potential impacts from human exposure levels once believed too low to be relevant).

<sup>30</sup> In a 2017 study, epidemiologist Shanna Swan and others published key findings regarding declining sperm counts, particularly in men living in Western countries. See Hagai Levine, Niels Jørgensen, Anderson Martino-Andrade, Jaime Mendiola, Dan Weksler-Derri, Irina Mindlis, Rachel Pinotti & Shanna H. Swan, 23 HUM. REPROD. UPDATE 646, 652–53 (2017); Sharon Lerner, *Toxic Chemicals Threaten Humanity’s Ability to Reproduce*, INTERCEPT (Jan. 24, 2021, 7:00 AM), <https://theintercept.com/2021/01/24/toxic-chemicals-human-sexuality-shanna-swan/> [<https://perma.cc/45QE-3LE6>] (interviewing researcher Shanna Swan regarding role of environmental chemicals in impacting reproduction). See generally Stefania D’Angelo & Rosaria Meccariello, *Microplastics: A Threat for Male Fertility*, 18 INT’L. J. ENV’T. RSCH. & PUB. HEALTH, no. 15, Mar. 2021, at 1 (examining the



to climate change. Although phasing fossil fuels out of the energy sector will be a significant improvement toward our carbon budget, the continued production of plastic must be calculated as a considerable risk for addressing climate change as well. This Part first reviews the health impacts of the lifecycle of plastics—considering fossil fuel production, manufacturing of plastics, and consumer exposure, and then explores environmental health impacts of plastics.

### *A. Potential Human Health Impacts*

#### *1. Fossil Fuels Production*

The foundational building block of plastic is petroleum. The impacts of fossil fuel production have been well established and therefore regulation of in site drilling operations is extensive. In the U.S., the Environmental Protection Agency (“EPA”) and numerous state laws and regulations address the industry’s extensive potential harm to air and water quality.<sup>31</sup> Other laws protect wildlife specifically and attempt to mitigate habitat destruction.<sup>32</sup> Offshore environmental laws also address oil and gas production, development and decommissioning with particular concern for offshore oil spills and impacts on fisheries and marine wildlife.<sup>33</sup>

In the 1970s some heralded the end of oil due to dwindling known reserves of easily extractable pools. But based on the development of hydraulic fracturing and horizontal drilling, many deposits of oil and natural gas are now extracted economically in places such as Pennsylvania and Texas. However, along with new technology came an increased awareness of the dangers to water resources. In particular, groundwater—a common source of drinking water—could become contaminated during exploration and drilling. Although the Energy Policy Act of 2005 exempted hydraulic fracturing, or “fracking,” from safe drinking water protections, many states impose disclosure rules to identify the chemicals used in fracking operations and other regulation.<sup>34</sup>

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link between microplastics and male fertility); Grace Hauck, *Add Falling Sperm Counts to the List of Threats to Human Survival, Epidemiologist Warns*, USA TODAY (Feb. 27, 2021, 4:58 PM), <https://www.usatoday.com/story/news/2021/02/27/falling-sperm-counts-threaten-humanity-chemicals-blame-book-says/6842950002/> [<https://perma.cc/R59Q-QPXQ>] (summarizing Shanna Swan’s research related to chemical exposures and men’s sperm counts).

<sup>31</sup> See, e.g., Clean Air Act, 42 U.S.C. §§ 7401–7671q (indicating the primary federal law protecting the nation’s air quality); Clean Water Act, 33 U.S.C. §§ 1251–1387 (indicating the primary federal law protecting the nation’s water quality).

<sup>32</sup> The Endangered Species Act, 16 U.S.C. §§ 1531–1544 (indicating the primary federal law protecting the nation’s imperiled wildlife).

<sup>33</sup> The Outer Continental Shelf Lands Act, 43 U.S.C. §§ 1331–1356b (addressing development of the nation’s offshore oil and gas resources).

<sup>34</sup> See generally Hannah Wiseman, *Fracturing Regulation Applied*, 22 DUKE ENV’T L. & POL’Y F. 361, 367 (2012) (examining the adequacy of state fracking regulations).

The imperative to reduce greenhouse gas emissions in the power sector shined a light on the benefits of natural gas. Natural gas has a lower greenhouse gas profile compared to heavier crude oils and coal often relied upon in the energy sector.<sup>35</sup> Hydraulic fracturing created a booming industry in the U.S. and turned the U.S. from a net importer to a net exporter of gas.<sup>36</sup> Thus, for the last decade the natural gas business has been robust. Extensive production is still occurring in many states.<sup>37</sup> However, as many countries have begun to pledge reduction of carbon emissions from their energy sectors and commit to renewable energy, the oil industry's need to find a market for their products has led to a surge in new plastics production.<sup>38</sup>

## 2. *Plastics Manufacturing*

The most common petrochemical product produced is plastic. Because plastic is made by refining natural gas products and mixing them with various petrochemicals, the environmental impacts of manufacturing are concentrated in proximity to manufacturing locations. Air, water, and soil impacts of manufacturing plants are regulated by mostly state and federal laws, with the potential for regulation via local health or environmental ordinances. For example, polyvinyl chloride, or "PVC," is understood to be one of the most toxic of the plastic products because in its production chemicals such as dioxins, phthalates, vinyl chloride, ethylene dichloride, lead, cadmium, and other toxic chemicals are released.<sup>39</sup>

One of the most notable areas of petrochemical manufacturing in the U.S. is in the South. "Cancer Alley" along the Mississippi River is well known for its

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<sup>35</sup> See *Frequently Asked Questions (FAQs): How Much Carbon Dioxide Is Produced When Different Fuels Are Burned?*, U.S. ENERGY INFO. ADMIN. (June 13, 2023), <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11> [https://perma.cc/AVF3-3FTH] (providing a comparison of the amount of carbon dioxide produced when different fuels are burned).

<sup>36</sup> U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2021 29 (2021).

<sup>37</sup> *Id.* at 22–23 (explaining that the EIA predicts that natural gas production will increase through 2050, identifying the likelihood of increased drilling in the Permian Basin which is located in Western Texas).

<sup>38</sup> Indeed, in 2019 the boom in shale gas in the U.S. impacted the market for recycled plastic as new feedstock of ethane reduced the demand for recycled plastic flakes. See S&P GLOBAL, *What Is the Future for Plastics?* (Feb. 24, 2020), <https://www.spglobal.com/en/research-insights/articles/what-is-the-future-for-plastics> [https://perma.cc/4FEU-9WWD].

<sup>39</sup> Lisa Zimmerman, Georg Dierkes, Thomas A. Ternes, Carolin Völker & Martin Wagner, *Benchmarking the in Vitro Toxicity and Chemical Composition of Plastic Consumer Products*, 53 ENV'T SCI. & TECH. 11467, 11474 (2019) (noting that PVC and polyurethane induced the highest toxicity); *Reducing PVC in Facilities with Vulnerable Populations*, AM. PUB. HEALTH ASSOC. (Nov. 1, 2011), <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/08/15/13/reducing-pvc-in-facilities-with-vulnerable-populations> [https://perma.cc/DV28-KQ5Y].

petrochemical plants and environmental racism.<sup>40</sup> The name “Cancer Alley” arose due to the higher-than-average incidence of cancer and association with the heavy presence of chemical plants and refineries, and their accompanying air, water, and soil pollution.<sup>41</sup> For years residents have been overburdened with poor air quality from toxic air emissions from petrochemical plants. Discharges of plastic to water are also a significant concern.<sup>42</sup>

The environmental justice angle of plastic production has received inadequate attention from policymakers as the battle over siting new plastics facilities in already overburdened locations continues to this day. Elected officials may tout job and economic growth,<sup>43</sup> while resistant local residents highlight human health and

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<sup>40</sup> Idna G. Castellón, *Cancer Alley and the Fight Against Environmental Racism*, 32 VILL. ENV'T L.J. 15, 15–16 (2021). Most residents in the area identify as Black or African American. *Id.* at 16. The term environmental racism refers to the unequal burden of environmental hazards on people of color and low-impact communities. Much of the research has involved examining the intentional placement of toxic waste facilities in neighborhoods where people of color reside. *See, e.g.*, LUKE W. COLE & SHEILA R. FOSTER, FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT 54–56 (2001). The EPA closed a civil rights investigation into Louisiana’s Department of Environmental Quality after initially detailing preliminary evidence of racial discrimination. But the fight for environmental justice in Cancer Alley continues. *See* Halle Parker, *Shuttered EPA Investigation Could’ve Brought ‘Meaningful Reform’ in Cancer Alley, Documents Reveal* (Aug. 29, 2023), <https://www.wwno.org/2023-08-29/shuttered-epa-investigation-couldve-brought-meaningful-reform-in-cancer-alley-documents-reveal> [<https://perma.cc/Q8HJ-JNNJ>].

<sup>41</sup> Castellón, *supra* note 40, at 1.

<sup>42</sup> Stacy Fernández, *Plastic Company Set to Pay \$50 Million Settlement in Water Pollution Suit Brought on by Texas Residents*, TEX. TRIB. (Oct. 15, 2019), <https://www.texastribune.org/2019/10/15/formosa-plastics-pay-50-million-texas-clean-water-act-lawsuit/> [<https://perma.cc/9922-29HB>] (discussing a major settlement with Formosa Plastics who illegally discharged plastic pellets into waterways highlighting the continued concern with violations of the Clean Water Act).

<sup>43</sup> Steven Mufson, *Huge Plastics Plant Faces Calls for Environmental Justice, Stiff Economic Headwinds*, WASH. POST (Apr. 19, 2021), <https://www.washingtonpost.com/climate-environment/2021/04/19/huge-plastics-plant-faces-calls-environmental-justice-stiff-economic-headwinds/> [<https://perma.cc/7QQY-B5E5>] (explaining the proposed project would potentially bring 8,000 temporary construction jobs and some 1,200 permanent jobs, Governor Jon Bel Edwards touted the project as key to a brighter economic future for Louisiana).

environmental harms.<sup>44</sup> As one reporter commented on the litigated battle<sup>45</sup> to site a huge new single-use plastic compound (called the Sunshine Complex) in St. James Parish, Louisiana: “There are two incompatible visions of the future. Call one ‘the end of plastics’; call the other ‘plastics forever.’ Sunshine is an almost \$10 billion wager that the age of plastic will not end.”<sup>46</sup> The project would be one of the largest plastics facilities in the world.<sup>47</sup>

### 3. *Consumer Exposures*

While the health impacts of fossil fuel extraction and the production of petrochemicals have been well documented for many years, the extent of the impact

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<sup>44</sup> Press Release, Ctr. for Biological Diversity, Army Corps Receives More than 5,500 Letters Demanding It Revoke Formosa Plastics’ Permit (Feb. 10, 2021), <https://biologicaldiversity.org/w/news/press-releases/army-corps-receives-more-than-5500-letters-demanding-it-revoke-formosa-plastics-permit-2021-02-10/> [<https://perma.cc/93D5-8EUT>] (highlighting that the plaintiffs and affiliated groups began a public campaign to demand ACOE revoke the plant’s permit which yielded over 5,500 letters in opposition to the facility).

<sup>45</sup> See Mosendz, *supra* note 15. Formosa Plastics Group proposes to build a plastics facility in St. James Parish, Louisiana along the Mississippi River. To build its plastics facility Formosa needed a wetlands permit from the U.S. Army Corps of Engineers (“ACOE”) to comply with the provisions of the Clean Water Act. See Press Release, Ctr. for Biological Diversity, Formosa Plastics’ Proposed Louisiana Plant Gets Permit to Destroy Wetlands: Army Corps Defies Concerns Over Plastic Pollution, Environmental Racism (Sept. 10, 2019), <https://biologicaldiversity.org/w/news/press-releases/formosa-plastics-proposed-louisiana-plant-gets-permit-to-destroy-wetlands-2019-09-10/> [<https://perma.cc/6PZX-D5DQ>]. The proposed facility would also approximately double the amount of toxic emissions in the area. See Oliver Laughland, *Multibillion-Dollar Louisiana Plastics Plant Put on Pause in a Win for Activists*, THE GUARDIAN (Aug. 18, 2021, 8:31 PM), <https://www.theguardian.com/us-news/2021/aug/18/louisiana-plastics-plant-toxic-emission-s-cancer-alley> [<https://perma.cc/ZP2D-5PGW>]. In the case of the Formosa Plastic permit, environmental groups including the Center for Biological Diversity, Louisiana Bucket Brigade, Rise St. James, and Healthy Gulf sued in federal court claiming ACOE failed to adequately analyze potential pollution impacts on poor and minority communities among other concerns. See Press Release, Healthy Gulf, Lawsuit Challenges Trump Administration’s Fast-Tracking of Louisiana Plastics Project, [https://healthygulf.org/press\\_releases/lawsuit-challenges-trump-administrations-fast-tracking-of-louisiana-plastics-project/](https://healthygulf.org/press_releases/lawsuit-challenges-trump-administrations-fast-tracking-of-louisiana-plastics-project/) [<https://perma.cc/M7CX-DNWK>] (last visited Aug. 29, 2023); Complaint for Declaratory and Injunctive Relief at 1–5, Ctr. for Biological Diversity v. U.S. Army Corps of Eng’rs, 2020 WL 5642287 (D.D.C. 2020) (No. 1:20-cv-00103), [https://www.biologicaldiversity.org/campaigns/plastic-production/pdfs/2020\\_01\\_14-Formosa-404-Complaint.pdf](https://www.biologicaldiversity.org/campaigns/plastic-production/pdfs/2020_01_14-Formosa-404-Complaint.pdf) [<https://perma.cc/4U2V-ELB7>].

<sup>46</sup> See Mosendz, *supra* note 15.

<sup>47</sup> David J. Mitchell, *Judge Tosses Lawsuit over Permit for \$9.4 Billion Formosa Plant Complex; Here’s What’s Next*, THE ADVOCATE (Jan. 5, 2021), [https://www.theadvocate.com/baton\\_rouge/news/article\\_3895ae9c-4f69-11eb-afcd-e78c03d643a4.html](https://www.theadvocate.com/baton_rouge/news/article_3895ae9c-4f69-11eb-afcd-e78c03d643a4.html) [<https://perma.cc/474S-ZXJW>].

of plastic exposure on human health is still unknown. It has only been about a decade that the threat from plastic exposure has gained prominence, thus research in this area is rapidly advancing. Plastic polymers are rarely used alone, and instead must incorporate plasticizers for flexibility (e.g., phthalates) or other chemicals. Common chemicals used in plastics—including lead, cadmium, zinc, and copper—can leach into the environment.<sup>48</sup>

According to some scientists the two most important chemicals associated with plastic products include Bisphenol A and phthalates.<sup>49</sup> Bisphenol A is commonly used in plastic packaging, even that which covers our food.<sup>50</sup> Phthalates are used as plasticizers, and research has shown a link to prenatal exposure and reduced IQ.<sup>51</sup> As discussed below, this known high level of risk led Congress to recently ban the use of certain phthalates in child toys and products.<sup>52</sup> Both chemicals are believed to impact reproductive health, directly through exposure to living individuals and fetuses, and even theorized to impact the reproductive capacity of unborn children through genetic alteration.<sup>53</sup>

Many chemicals closely associated with plastic are known to cause cancer, and others act as endocrine disruptors. Persistent organic pollutants (“POPs”) such as poly-chlorinated biphenols (“PCBs”) are regulated by other laws if used in industrial

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<sup>48</sup> See Alison Pearce Stevens, *Everyday Plastics Can Pollute, Leaching Thousands of Chemicals*, SCI. NEWS EXPLORES (Nov. 2, 2021, 6:30 AM), <https://www.snexplores.org/article/everyday-plastics-pollute-leaching-thousands-chemicals> [<https://perma.cc/6728-ETPM>]; CAL. HEALTH & SAFETY CODE §§ 25249.5–13 (addressing many plastic products such as PVC, wires and cables, and other materials that leach chemicals known to the state of California to cause cancer and reproductive toxicity). To meet the requirements of the law many producers label the products as containing chemicals known to the State to cause cancer and reproductive harm. See CAL. HEALTH & SAFETY CODE §§ 25249.5–13. See also *The Proposition 65 List*, CAL. OFFICE OF ENV’T HEALTH HAZARD ASSESSMENT, <https://oehha.ca.gov/proposition-65/proposition-65-list> [<https://perma.cc/EU9J-ZFEW>] (last visited July 29, 2023) (providing a list of chemicals known to cause cancer or birth defects or other reproductive harm).

<sup>49</sup> Zimmerman et al., *supra* note 39, at 11467 (noting there is little known about prominent plastic-associated chemicals, such as Bisphenol A and phthalates).

<sup>50</sup> D’Angelo & Meccariello, *supra* note 30, at 1 (noting bisphenol A is used for the production of drink and food packaging, and can leach into wastewater, contaminate food and beverages). See also Hannah M. Diaz, *Plastic: Breaking Down the Unbreakable*, 19 FLA. COASTAL L. REV. 85, 89–90 (2018).

<sup>51</sup> Tom Philpott, *These Ubiquitous Chemicals May Be Making Us Stupid*, MOTHER JONES (Dec. 16, 2014), <https://www.motherjones.com/food/2014/12/ubiquitous-chemical-thats-making-us-stupid/> [<https://perma.cc/J8DU-4EWT>].

<sup>52</sup> See *infra* Part IV.A.1.

<sup>53</sup> See Lerner, *supra* note 30 (explaining how the impact of exposure to plastic chemicals could be compounded over many generations).

contexts and in certain food products and paper food packaging, but exposure based on other consumer plastic products has escaped attention until more recently.<sup>54</sup>

### B. Environmental Health Impacts

One of the most well-studied and frequently articulated areas of plastic pollution impacts involves marine ecosystems and wildlife. Significant attention has been directed to the eastern part of the North Subtropical Pacific Gyre, also known as the Great Pacific Garbage Patch, which is the largest of five areas within the oceans where plastic pollution has begun to accumulate.<sup>55</sup> It is located between Hawaii and California and covers an area more than twice the size of the state of Texas.<sup>56</sup> The Great Pacific Garbage Patch is not a floating island of plastic; instead it is an area where degraded plastic bits are swept into a swirling mass with pieces often floating just below the surface.<sup>57</sup> While the Great Pacific Garbage Patch receives the greatest attention due to its visible impact, plastic has been found in the most remote depths of our oceans and can be located all along the water column.<sup>58</sup>

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<sup>54</sup> See Kevin Loria, *Most Plastic Products Contain Potentially Toxic Chemicals, Study Reveals*, CONSUMER REPS. (Oct. 2, 2019), <https://www.consumerreports.org/toxic-chemicals-substances/most-plastic-products-contain-potentially-toxic-chemicals/> [<https://perma.cc/5GC4-W9D6>]; *What Standards and Regulations Exist for PCB Exposure?*, AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY (May 24, 2023), <https://www.atsdr.cdc.gov/csem/polychlorinated-biphenyls/standards.html#:~:text=EPA%20requires%20that%20PCB%20spills,to%20EPA%20%5BATSDR%202000%5D.&text=FDA%20mandates%20tolerances%20of%200.2,10%20ppm%20%5BFDA%201996c%5D> [<https://perma.cc/NX7X-JMJ3>].

<sup>55</sup> See L. Lebreton, B. Slat, F. Ferrari, B. Sainte-Rose, J. Aitken, R. Marthouse, S. Hajbane, S. Cunsolo, A. Schwarz, A. Levivier et al., *Evidence that the Great Pacific Garbage Patch Is Rapidly Accumulating Plastic*, 8 SCI. REPS., Mar. 2018, at 1–15, <https://www.nature.com/articles/s41598-018-22939-w> [<https://perma.cc/53XC-F5C5>]; *Great Pacific Garbage Patch*, NAT'L GEOGRAPHIC, <https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/> [<https://perma.cc/62H5-JK4H>] (last visited Aug. 17, 2023).

<sup>56</sup> Compare Lebreton et al., *supra* note 55, at 1 (noting the area of the patch is 1.6 million km<sup>2</sup>) with *State Area Measurements and Internal Point Coordinates*, U.S. CENSUS BUREAU (Dec. 16, 2021), <https://www.census.gov/geographies/reference-files/2010/geo/state-area.html> [<https://perma.cc/JK9Y-MTKN>] (noting Texas is 695,662 km<sup>2</sup> in size).

<sup>57</sup> See Lebreton et al., *supra* note 55, at 1 (“Around 60% of the plastic produced is less dense than seawater. When introduced into the marine environment, buoyant plastic can be transported by surface currents and winds, recaptured by coastlines, degraded into smaller pieces by the action of sun, temperature variations, waves and marine life, or lose buoyancy and sink.”).

<sup>58</sup> See Madeline June Kass, *Fishing for Plastic: EU Targets Marine Pollution*, 34 NAT. RES. & ENV'T. 58, 58 (2019).

Plastic entanglement is of high concern because plastic wraps around the bodies of marine mammals and other marine life and causes choking or disfigurement.<sup>59</sup> Some items of plastic are made incredibly durable, such as fishing nets, and upon entering the marine environment take a long time to break down.<sup>60</sup> As these durable plastic items float through the marine environment they can also land on areas of coral and cause physical damage to plants and disrupt the coral ecosystems.<sup>61</sup>

Marine life has also been shown to starve to death due to the overconsumption of plastic.<sup>62</sup> Fish, whales, other marine mammals and sea birds ingest plastic because it is mistaken for a food source.<sup>63</sup> Sea turtles have mistaken floating plastic bags for jellyfish.<sup>64</sup> Sea birds are particularly impacted, with researchers finding bits of plastic items such as bags, bottle caps, and other bits in nearly all species of seabird impacted.<sup>65</sup> As the plastic cannot be digested and takes up space in the digestive system, the animals cannot obtain sufficient nutrition to survive.

Finally, the chemical assault on marine life is also a rising area of concern. Adsorption of chemicals is a significant concern both for marine life and the predators that consume chemical-laden prey.<sup>66</sup> Numerous studies have documented the rising level of plastic particles in fish. As fish are an important source of protein for people in many countries around the world, environmental health and human

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<sup>59</sup> See Dirk Xanthos & Tony R. Walker, *International Policies to Reduce Plastic Marine Pollution from Single-Use Plastics (Plastic Bags and Microbeads): A Review*, 118 MARINE POLLUTION BULL. 17, 18 (2017).

<sup>60</sup> Prabhakar R. Pawar, Sanket S. Shirgaonkar, & Rahul B. Patil, *Plastic Marine Debris: Sources, Distribution and Impacts on Coastal and Ocean Biodiversity*, 3 PENCIL PUBL'N. BIOLOGICAL SCIS. 40, 40–41 (2016); Manfred Klinkhardt, *Fishing Gear Made from Biodegradable Plastic*, EUROFISH INT'L ORG. (Feb. 17, 2023), <https://eurofish.dk/fishing-gear-made-from-biodegradable-plastic/> [<https://perma.cc/89E7-88KG>].

<sup>61</sup> Pawar et al., *supra* note 60, at 45.

<sup>62</sup> See MARINE PLASTIC POLLUTION, INT'L UNION FOR CONSERVATION OF NATURE (IUCN) (2021), <https://www.iucn.org/resources/issues-brief/marine-plastic-pollution> [<https://perma.cc/L56T-TB89>].

<sup>63</sup> *Id.*; see generally Sarah C. Gall & Richard C. Thompson, *The Impact of Debris on Marine Life*, 92 MARINE POLLUTION BULL. 170 (2015) (providing a comprehensive review of impacts to marine life and noting high reports of ingestion from birds and sea turtles).

<sup>64</sup> Qamar A. Schuyler, Chris Wilcox, Kathy Townsend, B. Denise Hardesty & N. Justin Marshall, *Mistaken Identity? Visual Similarities of Marine Debris to Natural Prey Items of Sea Turtles*, 14 BMC ECOLOGY, no. 1, 2014, at 1.

<sup>65</sup> Laura Parker, *Nearly Every Seabird on Earth Is Eating Plastic*, NAT'L GEOGRAPHIC (Sept. 2, 2015), <https://www.nationalgeographic.com/science/article/15092-plastic-seabirds-albatross-australia> [<https://perma.cc/7LPT-JTS5>]; see also Gall & Thompson, *supra* note 63, at 173 (providing graphical analysis on harm of plastic to seabirds).

<sup>66</sup> See Chelsea M. Rochman, *The Complex Mixture, Fate and Toxicity of Chemicals Associated with Plastic Debris in the Marine Environment*, in MARINE ANTHROPOGENIC LITTER at 117, 125 (Melanie Bergmann, Michael Klages & Lars Gutow, eds. 2015). Bioaccumulation of chemicals in plastic debris is an ongoing research area. See Almira Van, Chelsea M. Rochman, Elisa M. Flores, Kish L. Hill, Erica Vargas, Serena A. Vargas & Euhna Hoh, *Persistent Organic Pollutants in Plastic Marine Debris Found on Beaches in San Diego, California*, 86 CHEMOSPHERE 258 (2021).

health are closely linked. It is estimated that by the end of this century, a person who regularly eats seafood will ingest 780,000 plastic pieces a year, and of that 4,000 pieces could be absorbed through their digestive system.<sup>67</sup>

The evidence of harm from plastic is abundant. The impact of plastic on the environment is one potential marker of the Anthropocene, the newly-named geologic era where human activities are the dominant force on the planet.<sup>68</sup> This anthropogenic (human-created) material has left a mark on Earth's rock record.<sup>69</sup> Moreover, scientists are considering whether plastic's assault on the environment and wildlife warrants identifying plastic as a planetary boundary—a limit beyond which Earth's systems are destabilized.<sup>70</sup> In sum, plastic has become a critical environmental problem necessitating an appropriate legal response.

## II. PLASTICS AND INSTRUMENT CHOICE IN ENVIRONMENTAL LAW

As policymakers confront the plastic crisis, a wide variety of policy prescriptions have been posed to address the problem.<sup>71</sup> Principles of policymaking

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<sup>67</sup> Margi Murphy, *BIT FISHY Seafood Lovers Eat 11,000 Pieces of Toxic Plastic Every Year Thanks to this Dirty Habit*, THE SUN (Jan. 25, 2017, 4:02 PM), <https://www.thesun.co.uk/news/2703686/seafood-lovers-eat-11000-pieces-of-toxic-plastic-every-year-thanks-to-this-dirty-habit/> [<https://perma.cc/FXM8-REUH>].

<sup>68</sup> See Corcoran et al., *supra* note 8, at 4, 7.

<sup>69</sup> *Id.*

<sup>70</sup> See Patricia Villarrubia-Gomez, Sarah E. Cornell & Joan Fabres, *Marine Plastic Pollution as a Planetary Boundary Threat – The Drifting Piece in the Sustainability Puzzle*, 96 MARINE POLICY 213 (2018). The concept of planetary boundaries was created by environmental scientists to further the discussion of sustainability and human impact on the Earth's natural systems. See Johan Rockström, Will Steffen, Kevin Noone, Åsa Persson, F. Stuart Chapin III, Eric Lambin, Timothy M. Lenton, Marten Scheffer, Carl Folke, Hans Joachim Schellnhuber, Björn Nykvist et al., *Planetary Boundaries: Exploring the Safe Operating Space for Humanity*, 14 ECOLOGY & SOC'Y 32 (2009). Boundaries identify where humans might tip the Earth into rapid change that would impair sustainability for humankind. Will Steffen, Katherine Richardson, Johan Roskstrom, Sarah E. Cornell, Ingo Fetzer, Elena M. Bennett, Reinette Biggs, Stephen P. Carpenter, Wim de Vries, Cynthia A. de Wit et. al., *Planetary Boundaries: Guiding Human Development on a Changing Planet*, 347 SCIENCE, no. 6223, Feb. 2015, at 1259855-1, 1259855-4, 1259855-5. There are nine areas where human actions since the industrial revolution have become the main driver of global environmental change, and specifically identifying areas where human activities are not safe and could drive the earth into a new state (such as causing the depletion of genetic diversity and climate change). These nine areas include climate change, biodiversity loss, nitrogen cycle, phosphorous, ocean acidification, land use, freshwater, ozone depletion, atmospheric aerosols, chemical pollution. In the last category, among chemical pollution is consideration of microplastics as unique plastic polymers. *Id.* at 1259855-7.

<sup>71</sup> See *infra* Part V. Promoting a shift to a circular-economy (produce, reuse and recycle) in contrast to the current linear economy (produce, use, dispose) is one of the broadest policy prescriptions which would touch plastics along with other materials and is being pursued by the European Union, promoted by United Nations Environment Program and other leading



dominating environmental governance make it more difficult to enact bans. For years banning single-use plastic has been offered as an effective policy prescription “hiding in plain sight.”<sup>72</sup> Resistance to banning is driven by competing narratives around the source of our plastic pollution crisis. Is the problem caused by a failure of recycling efforts? Should we blame weak waste management systems? Are consumerism and overconsumption primarily to blame? Or is the crisis primarily driven by corporate social irresponsibility? Regardless of which frame or combination is used as the foundation for regulation, plastic bans can assist to confront the plastic pollution crisis.

Further complicating policy choice is that plastic pollution largely aggregates in our oceans. Plastic pollution is a problem exacerbated by two colliding commons: one natural, the other manmade. Our oceans function as a commons where multiple nations have access to a shared resource.<sup>73</sup> Moreover, the plastic pollution problem is a result of a regulatory commons, where multiple domestic agencies and international instruments play a role in regulation but have incentives not to or have used their regulatory power in an extremely limited way.<sup>74</sup> This Part examines the competing narratives around plastic use, and how those narratives drive divergent policy responses. After examining the influential principles in environmental

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organizations such as the PEW Charitable Trusts. *See, e.g., Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A New Circular Economy Action Plan for a Cleaner and More Competitive Europe*, EUROPEAN COMM’N at 15–16 (Nov. 3, 2020), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A98%3AFIN> [<https://perma.cc/Q4A9-JJBW>]; *Joint Statement on Preventing Ocean Plastic Pollution*, PEW TRUSTS, [https://www.pewtrusts.org/-/media/assets/2021/06/plastics-joint-statement\\_clean\\_final.pdf](https://www.pewtrusts.org/-/media/assets/2021/06/plastics-joint-statement_clean_final.pdf) [<https://perma.cc/XYB3-PLKN>] (last visited Aug. 17, 2023).

<sup>72</sup> *See* Haley Clinton, *Plastic Waste Solutions Hiding in Plain Sight: Single-Use Plastic Product Bans*, U.S. PIRG (Mar. 31, 2021), <https://uspirg.org/blogs/blog/usp/plastic-waste-solutions-hiding-plain-sight-single-use-plastic-product-bans> [<https://perma.cc/2T77-BAEY>].

<sup>73</sup> In academic discourse a commons is a public or shared common resource. The oceans of the high seas and the atmosphere of the planet are natural commons. One problem that emerges in an unregulated commons is that people will fail to adequately conserve and will overuse, foul or deplete the resource. One response to this problem is to incentivize users to internalize their externalities. In recognizing continued population growth and finite resources of the planet, Garrett Hardin’s seminal work, *The Tragedy of the Commons*, discusses alternatives to the problems of each person maximizing their use of the commons. Hardin posits that alternatives such as regulation by the state, taxing, or enclosing the commons and managing its use through private property rights can be used to avoid depleting or destroying common resources. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

<sup>74</sup> *See generally* William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1 (2003) (describing what the author dubs “regulatory commons” and how this creates incentives for legislators or regulators to not use their regulatory power).

policymaking (specifically the context for plastics), a picture emerges that banning unnecessary plastic is an underutilized policy response.

### A. *Competing Narratives and Colliding Commons*

There is wide agreement that plastic is causing unacceptable levels of harm. However, there is no single, consistent explanation for the drivers of this harm.<sup>75</sup> Framing the problem as one of insufficient constraints on the production of single-use plastic garbage supports the position that bans on production will address the influx of virgin plastic material into the environment. But largely policymakers have avoided this framework, pushed by strong lobbying efforts by the plastics industry, and have thus opted for weaker policy prescriptions that blame individual behavior for marine debris.

To address the threats of plastic pollution, an inordinate amount of attention has been directed at changing individual behavior under the false assumption that typical use of plastic does not cause foreseeable harm. The strategy of changing individual behavior to reduce, reuse and recycle, however, has failed. For example, most consumers in the U.S. have limited capacity to avoid plastic, particularly in their food packaging and common household goods.

The plastic crisis has been observed in the marine debris context most acutely. Our oceans are a classic global commons where many people can occupy and use the shared space which, without intervention and regulatory constraints, can be overutilized.<sup>76</sup> But the plastic crisis is not simply a result of waste product entering a property commons which must be addressed by changing individual behavior; it is also a result of a regulatory commons with harms that transcend the capacity of individual consumers. For this reason, a more robust regulatory response is necessary.

There are multiple points along the lifecycle of plastics which must be regulated to address the full suite of impacts. A variety of international, national and local laws regulate some part of marine plastic debris, which has been the subject of concern with the visible Great Pacific Garbage Patch.<sup>77</sup> Professor William Buzbee has described a theory of regulatory gaps that helps to understand why we have landed in a precarious place with plastic pollution.<sup>78</sup> As Prof. Buzbee explains, “when social ills match no particular political-legal regime or jurisdiction, but instead encounter

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<sup>75</sup> See generally Rob Kaplan, *Pointing Fingers: Ocean Plastic Is Tragedy of the Commons*, FORBES (May 16, 2019, 3:44 PM), <https://www.forbes.com/sites/robkaplan/2019/05/16/pointing-fingers-ocean-plastic-is-tragedy-of-the-commons/?sh=83493c0636ad> [<https://perma.cc/KYH9-3RJV>] (discussing competing efforts to put blame on consumers, governments, and plastic polluters).

<sup>76</sup> For the classic discussion of the tragedy of the commons, see Hardin *supra* note 73.

<sup>77</sup> See Jessica Coulter, *A Sea Change to Change the Sea: Stopping the Spread of the Pacific Garbage Patch with Small-Scale Environmental Legislation*, 51 WM. & MARY L. REV. 1959, 1961 (2010) (heralding nurdle regulation and bag bans in California for their capacity to reduce pollution of the Pacific Garbage patch).

<sup>78</sup> Buzbee, *supra* note 74, at 5–6.

fragmented political-legal structures, predictable incentives arise for potential regulators to opt against investing in such regulatory opportunities.<sup>79</sup> Plastic pollution has become a crisis because it results from several compounding factors: (1) design for single use but also infinite longevity in the environment; (2) inadequate waste collection and recycling; (3) leakage; and (4) direct pollution from manufacturing facilities. State and federal agencies in the U.S. such as the EPA, state environmental health departments, and waste management agencies have potential power to address plastic pollution to address these failures. Regulation is also emerging from local governments. Plastic bans on a limited number of products have begun to address the gaps in regulatory means to curb plastic from polluting our rivers, lakes, and oceans.<sup>80</sup>

The mismatch and overlap in regulating plastic pollution is evident. For example, plastics manufacturing is regulated as an industry for its impact on air and water resources.<sup>81</sup> The most powerful of our federal laws designed to protect the chemical and biological integrity of waters is the Clean Water Act. The law prohibits any discharges to the waters of the U.S. unless specifically permitted and could therefore more stringently address plastic pollution into our waterways.<sup>82</sup> Further, many of the chemical components of plastic are also regulated. And very recently law and policymakers have begun to regulate some plastic consumer products specifically. But the waste stream from plastic—particularly single-use plastic items—escapes adequate regulation. This results in individuals discarding items into a waste stream operated by inadequate waste management regimes. As a result, single-use plastics are entering the environment—sometimes in countries far remote from where the product itself was either produced or used.<sup>83</sup> For example, Indonesia is the second largest source of marine plastic debris, with many developed nations exporting their garbage there—in particular unrecyclable plastic. The picture is clear

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<sup>79</sup> *Id.*

<sup>80</sup> See generally Coulter, *supra* note 77.

<sup>81</sup> See generally *Plastics and Rubber Products Manufacturing (NAICS 326)*, U.S. ENV'T PROT. AGENCY (Aug. 31, 2022), <https://www.epa.gov/regulatory-information-sector/plastics-and-rubber-products-manufacturing-naics-326> [<https://perma.cc/FQ5F-UGBN>] (listing air and water laws and regulations of the production of plastics).

<sup>82</sup> For a discussion of the multiple sections of the statute that should be curbing plastic pollution and the role of private litigation to spur stronger government response, see Rachael E. Salcido, *Plastic Activism and the Clean Water Act*, 52 ENV'T L. 307 (2022) (discussing the multiple sections of the statute that should be curbing plastic pollution and the role of private litigation to spur stronger government response); see also Stephanie F. Wood, *Move over Diamonds—Plastics Are Forever: How the Rise of Plastic Pollution in Water Can Be Regulated*, 29 VILL. ENV'T L.J. 155, 158 (2018) (calling out the potential role for the Clean Water Act).

<sup>83</sup> See, e.g., Kate Whiting, *Indonesia Has a Plan to Deal with Its Plastic Waste Problem*, WORLD ECON. F. (Mar. 13, 2019), <https://www.weforum.org/agenda/2019/03/indonesia-has-a-plan-to-deal-with-its-plastic-waste-problem/> [<https://perma.cc/M9LQ-U88D>] (noting that Indonesia is the second largest source of marine plastic debris, with many developed nations exporting their garbage there—in particular unrecyclable plastic).

that it is not just individuals but also local waste management systems that must be engaged to capture plastic waste.

The conventional term that has been coined for this plastic pollution escaping waste management systems—leakage—masks the actual harm it causes. While this may be unintentional, use of leakage seems to work to diminish the magnitude of the problem and falsely make it seem unimportant. A leak evokes the image of an unintentional spill of a minor nature. But leakage causes foreseeable harm, particularly with the well-known nature of how plastic is escaping inadequate waste collection efforts. Of course, even a small leak from an enormous volume over a long period of time can be disastrous.

Capturing plastic leakage is insufficient to address our plastic crisis. The inadequacy of plastic regulation runs far deeper. First, we have failed to acknowledge or appreciate the harms from plastic, thus allowing it to evade rational scrutiny under our existing environmental norms. Second, we have allowed the plastic industry to operate with impunity. Governments are struggling to address the lack of capacity in waste management systems. Meanwhile, the industry promotes itself as serving a public interest by providing consumers with a harmless and valuable good while engaging in deception about environmental consequences of plastic products. The industry has perpetuated a myth that plastic products are indispensable, that its value proposition is unquestionable and that consent of the regulated must dictate regulatory design. Finally, the status quo fails to incentivize research and development to create less harmful products. Bans can address all three of these concerns, in a powerful and direct way.

### *B. The Theory of Harm in Environmental Law*

One reason we have reached the crisis point with plastic pollution is that the harms from plastic were not initially anticipated. Although a variety of human health and environmental impacts from plastic are now evident, a continuing debate over the extent of the harm from plastic continues and undermines efforts to implement effective regulation.

Professor Al Lin explains how the underlying concern in environmental law is a foundational question about harm.<sup>84</sup> In his influential exploration of the theoretical concept of harm, he unpacks how the concept is malleable and more a question of values than evidence or facts.<sup>85</sup> Lin recognizes that in a more complex world identification of harm becomes more contested.<sup>86</sup> Harm is a normative concept, which Prof. Lin articulates in environmental law to be akin to a “setback to human interests that community norms have deemed to be significant.”<sup>87</sup> In drawing on influential philosopher John Stuart Mill’s conception of harm, Lin explains that our

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<sup>84</sup> See Albert C. Lin, *The Unifying Role of Harm in Environmental Law*, 2006 WIS. L. REV. 897, 898 (2006).

<sup>85</sup> *Id.* at 898–901.

<sup>86</sup> *Id.* at 900.

<sup>87</sup> *Id.* at 901.

understanding of harm is much broader given our growing scientific knowledge, and there are greater cumulative effects in a world where people are far more numerous. There are of course other theories which support state action in the interest of the public to ban or otherwise regulate plastic, and some cite moral responsibility or paternalistic views. Others point out the aesthetic harms from accumulated garbage offends the very sense of a well-ordered society. In some places, the harm to tourism from plastic debris littered beaches has itself spurred action to curb pollution.<sup>88</sup>

Within our environmental governance frameworks, we also make choices about how to design responses to address harm we seek to avoid.<sup>89</sup> As Prof. Rob Fishman explains, there is an ongoing debate in the pollution control arena between categorical and utilitarian approaches.<sup>90</sup> As he explains in the context of harm and the Endangered Species Act, “the utilitarian approach seeks to balance risk to optimize our policy choices. It requires more information to implement because it demands proportionate controls, limits, or encouragement of activities to balance the probable costs with the benefits.”<sup>91</sup> This approach has also been described as relying on the “cumulative preferences of individual[]” and that “[t]he right utilitarian decision maximizes the satisfaction of preferences.”<sup>92</sup> In contrast, the categorical approach would ban an activity to avoid harm, or at minimum shift the burden of proof to the entity conducting the activity to prove they are not inflicting harm.<sup>93</sup> Thus, whether or not we perceive an actual harm drives an initial decision to regulate, which is then pushed into either a categorical or utilitarian design framework. Moreover, we have long relied on a utilitarian model to address plastic waste, which has led to a crisis point.

A frequent problem within U.S. environmental law is our tendency to be slow to recognize the harms from some actions, so environmental problems must reach crisis level before regulation ensues. This has been true for climate change, biodiversity decline, overfishing, and the hole in the ozone layer. It is also true of the origins of our strongest water protections, the Clean Water Act, which was

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<sup>88</sup> See Kass, *supra* note 58, at 58–59 (noting that in the E.U., which has adopted a mix of bans and regulations on plastic products, the beaches are littered with single-use plastic products such as straws, plates, beverage stirrers, fast food containers); see also *id.* at 59 (finding an estimated cost to the E.U. economy was between \$289 to \$776 million per year, based on impacts to recreation, tourism, and fisheries although this is speculated to be far short of actuals costs to the economy).

<sup>89</sup> See Robert L. Fischman, *The Divides of Environmental Law and the Problem of Harm in the Endangered Species Act*, 83 IND. L.J. 661, 670 (2008).

<sup>90</sup> *Id.* (“Categorical approaches in environmental law limit uses based on their attributes as environmentally disfavored behavior. These are the ‘bads’ we seek to avoid, minimize, and mitigate. In environmental law, we often make broad judgments about actions such as roadbuilding, hunting, or emitting pollution, without regard to the actual consequences of the particular application. In contrast, utilitarian approaches are less concerned with the nature of the activity itself and more concerned with the effects produced by the activity, such as risks of cancer, death, eutrophication, or extinction.”).

<sup>91</sup> *Id.* at 671.

<sup>92</sup> *Id.* (drawing on the work of Professor Mark Sagoff).

<sup>93</sup> See *id.* at 670–71.

spurred by industrial chemical fires along rivers in the U.S. The most frequent regulatory action within environmental governance is a reactive response rather than a proactive system to screen out future potential harm. This permissive orientation has grown over time to a strong insistence by the potentially regulated community for undisputed evidence of specific harms that should be targeted by laser-focused regulation—the utilitarian approach necessitating time, effort, information gathering and complex enforcement systems. That effort can exhaust available government resources.<sup>94</sup>

It is therefore significant to see the curtailment of plastic production and use coming from a diverse source of stakeholders. National bans are now multiplying, with the European Union and India pledging to eliminate single-use plastic within

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<sup>94</sup> The most direct example of this comes from chemical regulation, as discussed with the amendments to the Toxic Substance Control Act, *supra* Part II.D. See David Markell, *An Overview of TSCA, Its History and Key Underlying Assumptions, and Its Place in Environmental Regulation*, 32 WASH. U. J. L. & POL'Y 333, 349–356 (2010) (examining the enormity of the task assigned to EPA and the GAO's findings on the limitations of TSCA's structure for facilitating EPA's work). The GAO noted that EPA could review substantially more chemicals in less time if TSCA's structure were revised to provide EPA more authority to obtain test data. *Id.* at 355–56. Still to date both environmentalists and industry agree that underfunding at EPA leads to an inability for the agency to address the full scope of its mission. Lisa Whitney Coleman, *Congressional Lack of Funding Continues to Jeopardize EPA Operations* (May 18, 2022), <https://ehsdailyadvisor.blr.com/2022/05/congressional-lack-of-funding-continues-to-jeopardize-epa-operations/> [<https://perma.cc/DP8B-TW4P>] (specifically noting that TSCA requires EPA to approve new chemicals and the industry faces a backlog).

Another example is from the Endangered Species Act. Because the same budget for the Fish and Wildlife Service includes both habitat designation and species designation, the Service has been more likely to list species and less active in habitat designations due to the burden of proving that economic burdens do not support a decision against designation, and to avoid litigation. The Service, which is chronically underfunded, has been regularly sued due to inactivity in listing, but faces equal criticism for lack of emphasis on recovery plans for each listed species. See Benjamin Jesup, *Endless War or End this War? The History of Deadline Litigation Under Section 4 of the Endangered Species Act and the Multi-District Litigation Settlements*, 14 VT. J. ENV'T L. 327, 352 (2013) (explaining that FWS viewed designation of critical habitat as expensive, controversial, and adding little protection once a species was listed). For a criticism of the slow progress on recovery plans, see Jacob W. Malcom & Ya-Wei Li, *Missing, Delayed, and Old: The Status of ESA Recovery Plans*, 11 CONSERVATION LETTERS, no. 6, 2018, at 6–8 (emphasizing administrative and technological changes necessary in addition to closing the funding gap). See also J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L. J. 757 (2003). The authors explain how the sheer accretion of rules over time leads to system burdens that “can confound an organization's ability to comply even when it devotes sufficient resources to meeting all the information and effort burdens.” *Id.* at 763. While focusing primarily on the regulated community, system burdens also complicate matters for regulators. *Id.* at 805.

the next few years.<sup>95</sup> China has enacted strong bans on single-use plastic items including utensils and bags, phasing in some deadlines while having some of the bans almost immediately effective at the start of January 2021. Local bans in cities across the U.S. are commonplace. Moreover, a wide variety of businesses are acknowledging that their consumers have pressured for change, many signing the New Plastics Economy Global Commitment to reduce plastics.<sup>96</sup> Companies seek brand loyalty from consumers who demand greater sustainability.<sup>97</sup>

In the conception of Prof. Lin, plastic pollution can now confidently be regarded as posing a “setback to human interests that community norms have deemed to be significant.”<sup>98</sup> Years of educational campaigns have pierced the public consciousness and the public is unsatisfied with weak responses such as recommendations for individual responsibility. Thus, even from a utilitarian decision-making framework, bans are competing successfully as the expression of collective preferences. It is clear the problem must be addressed at the tap—by the plastic producers themselves.<sup>99</sup>

### C. *The Precautionary Principle*

To understand the drawbacks of the U.S. environmental regulatory model, it is important to understand why environmental responses are reactive. The backbone of environmental governance is harm, and U.S. lawmakers are not motivated to action, particularly against business interests, when there is doubt regarding the nature or extent of harm. Other nations stand in contrast to the U.S. in that they have adopted regulatory schemes that follow the precautionary principle. The

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<sup>95</sup> See Emmy Nøklebye, Hans Nicolai Adam, Avanti Roy-Basu, Girija K. Bharat & Eirik Hovland Steindal, *Plastic Bans in India – Addressing the Socio-Economic and Environmental Complexities*, 139 ENV'T SCI. & POL'Y 219, 221 (2023) (tracing history of single-use ban in India, including that bans in India were first adopted in 2018 with a goal to eliminate certain single-use plastics by 2022).

<sup>96</sup> Linda Godfrey, *Waste Plastic, the Challenge Facing Developing Countries—Ban It, Change It, Collect It?*, 4 RECYCLING, no. 1, 2019, at 1, 4.

<sup>97</sup> See *id.*; see also Oliver Smith & Avi Brisman, *Plastic Waste and the Environmental Crisis Industry*, 29 CRITICAL CRIMINOLOGY 289, 302 (2021) (arguing that demand to have companies be more eco-conscious may have a downside, as consumers feel their purchases have less impact on the environment than may actually be the case); Andrew Martins, *Most Consumers Want Sustainable Products and Packaging*, BUS. NEWS DAILY (Feb. 21, 2023), <https://www.businessnewsdaily.com/15087-consumers-want-sustainable-products.html> [<https://perma.cc/R9C6-GVE7>].

<sup>98</sup> Lin, *supra* note 84, at 901.

<sup>99</sup> The plastic waste generated by plastic packaging is the most significant of various sectors. The World Economic Forum emphasized the need to reduce packaging, and many users—such as supermarkets in the U.K. and even Walmart in North America—are questioning their need for wrapping vegetables in unnecessary plastic or using the packaging in toy boxes. See Alex Thornton, *7 Ways Packaging Is Changing to Reduce Plastic Waste*, WORLD ECON. F. (Dec. 2, 2020), <https://www.weforum.org/agenda/2020/12/sustainable-packaging-reduce-plastic-waste/> [<https://perma.cc/G67D-P8KS>].

precautionary principle holds that governments should act even in the face of conflicting evidence if there is a risk of irreversible damage to the environment or human health.<sup>100</sup> This principle has endured criticism from the regulated community as being unscientific since it promotes action before perfect information is secured.<sup>101</sup> A related component of the failure to aggressively address plastic has been the hesitancy of lawmakers to act prior to strong scientific consensus on the harms of plastics.

The precautionary principle links to other environmental norms including intra- and inter-generational equity which are now part of the evolving nature of environmental governance. It is difficult to constrain the activities of current generations to conserve resources for the future, and environmental law has attempted to grapple with this battle.<sup>102</sup> For U.S. policymaking, this translates to a regulatory environment that is more liberal in allowing new substances and technology into the environment which may cause irreversible harm. Moreover, public information campaigns to discredit scientific information about human health and environmental harm has become a challenge for lawmakers as well.<sup>103</sup> This is just as true in the area of plastic as it has been with tobacco, climate change, and the COVID-19 pandemic. Although to date the U.S. has eschewed a precautionary approach, for the sake of the climate, the environment, and human health, banning plastic should be pursued as a bulwark against the potential crossing of a planetary boundary.

#### *D. Seeking Least Burdensome Approaches*

Bans, compared to other policy tools, involve a choice and then enforcement by the government. In one articulation or another, the principle behind our environmental laws is to allow the maximum amount of development and production. Even where our laws are health-based, we do not insist upon the avoidance of all health impacts.<sup>104</sup> As Professor William Buzbee recognized, there

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<sup>100</sup> See Daniel Bodansky, *The Precautionary Principle in US Environmental Law*, in INTERPRETING THE PRECAUTIONARY PRINCIPLE 203, 203 (Tim O’Riordan & James Cameron eds., 1994).

<sup>101</sup> Per Sandin, Martin Peterson, Sven Ove Hansson, Christina Rudén & André Juthe, *Five Charges Against the Precautionary Principle*, 5 J. RISK RSCH. 287, 295–96 (2002) (defending against attacks that the precautionary principle is unscientific).

<sup>102</sup> See Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1204–05 (2009); Lin, *supra* note 84, at 976–77.

<sup>103</sup> See, e.g., Shannon M. Roesler, *Evaluating Corporate Speech About Science*, 106 GEO. L.J. 447, 479–82 (2018).

<sup>104</sup> Regulation under the Clean Air Act provides one example. Often our health-based regulations do require consideration of vulnerable populations but do not require elimination of all potential for harm. For a prominent case setting the national ambient air quality standard for air lead, see *Lead Industries Ass’n, Inc. v. Env’t Prot. Agency*, 647 F.2d 1130 (D.C. Cir. 1980).



is a continuous narrative decrying over-regulation.<sup>105</sup> In particular, bans are criticized as an extreme measure, with the famous description of EPA's ban on existing and future asbestos use in *Corrosion Proof Fittings* a regulatory "death penalty alternative."<sup>106</sup>

The best example of resistance to regulatory burden in environmental law was the former version of the Toxic Substance Control Act ("TSCA"). TSCA regulates entry of chemicals onto the U.S. market. Chemical regulation in the U.S.—until TSCA's recent amendment—was extremely permissive and did not embody a precautionary approach.<sup>107</sup> This is unlike the approach taken in other developed nations, which employ a version of the precautionary principle to regulate chemical substances such as the E.U.'s seminal REACH system for registering chemicals.<sup>108</sup> In the U.S., the EPA generally had the burden to prove a chemical was unsafe, even in the face of insufficient information. The EPA had to first prove a chemical posed an unreasonable risk of harm before regulators could consider regulatory action, and once that threshold question was met, the regulation needed to be the least burdensome option available to prevent the specific harm.

Finally, this inadequate system was replaced by the Frank R. Lautenberg Chemical Safety Act of 2016.<sup>109</sup> It eliminated the unreasonable risk and least burdensome framework and put into place a schedule to evaluate chemicals. Most significantly, the EPA now must evaluate the safety of a chemical before it is allowed on the market, the evaluation of whether a chemical poses an "unreasonable risk" is no longer determined with costs and other non-risk factors weighing in.<sup>110</sup> The effect of this change is to place the burden on the chemical industry itself to provide necessary data to determine safety.<sup>111</sup>

In sum, the U.S. has largely eschewed a precautionary approach to regulation when information is incomplete, even when the dangers of harm are high. Seeking less burdensome forms of regulation is rational but can lead to mounting harm if lawmakers are slow to adopt more effective forms of regulation. The plastic industry has taken advantage of this dynamic specifically promoting recycling instead of

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<sup>105</sup> See generally Buzbee, *supra* note 74 (describing what the author dubs "regulatory commons" and how this creates incentives for legislators or regulators to not use their regulatory power).

<sup>106</sup> *Corrosion Proof Fittings v. Env't Prot. Agency*, 947 F.2d 1201, 1215–16 (5th Cir. 1991).

<sup>107</sup> See Wendy E. Wagner, *The Precautionary Principle and Chemical Regulation in the U.S.*, 6 HUM. & ECOLOGICAL RISK ASSESSMENT 459, 468 (2000) (noting the "unprecautionary" approach of TSCA).

<sup>108</sup> John S. Applegate, *Synthesizing TSCA and REACH: Practical Principles for Chemical Regulation Reform*, 35 ECOLOGY L.Q. 721, 747 (2008) (identifying the precautionary approach in REACH). Prof. Applegate notes that the precautionary principle, as a principle of international environmental law, was not available to the drafters of TSCA, but was a "foundational concept for the drafters of REACH." *Id.*

<sup>109</sup> See JOHN G. SPRANKLING & RACHAEL E. SALCIDO, *THE LAW OF HAZARDOUS WASTES AND TOXIC SUBSTANCES IN A NUTSHELL* 62 (3d ed. 2018).

<sup>110</sup> 15 U.S.C. 2604(a)(3); see also *id.* at 62, 77–78.

<sup>111</sup> See *id.* at 62.

production limits.<sup>112</sup> Plastic bans have acted as a disruptive force against this built-in resistance and can continue to shape the design of international efforts to tackle the plastic crisis.

*E. New Paradigms in Environmental Law*

Without a doubt, there is consensus that multiple actors and institutions must be engaged to address the plastic pollution crisis. In his scholarship on fourth generation environmental law, Professor Tony Arnold explained how “environmental law is evolving to become more integrationalist and multimodal”—not only to provide additional levels of environmental protection but also in response to the complexity of the problems in our modern world.<sup>113</sup> Multi-modality can refer to many things, but one iteration is the use of multiple categories of policy instruments to address a problem. In the case of plastic pollution, this should include bans as a proven tool to address items whose risk and harm profiles far outweigh their utility. Bans work together with public information campaigns, voluntary switching measures, and innovation driving less demand for certain plastic products in the first place.<sup>114</sup> Bans contribute to public awareness, with some characterizing them as having a measure of “shock value.”<sup>115</sup>

While laws in the U.S. have had to be implemented in new ways to accommodate regulatory gaps and holes, environmental laws have also had to evolve through agency implementation when Congress does not step in to update the law to address new challenges.<sup>116</sup> Plastic bans have played an important role by pushing localities and states to experiment with a problem that is both local and global. But the onslaught of new plastic production cannot be addressed through public education campaigns alone. Plastic producers are under extreme pressure to access new markets, because the rising movement to reduce climate change emissions is pressuring rapid de-carbonization and switch to renewable energy. Some parts of the

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<sup>112</sup> Oliver Smith and Avi Brisman put forth interesting dialogue on the subject of our complex relationship with plastic and capitalism’s draw toward eco-consumerism. They posit that the “environmental crisis industry” formed by an assemblage of media, government and corporate interests works against meaningful change in the face of environmental catastrophe. See Smith & Brisman, *supra* note 97, at 299. Their compelling arguments emphasize the fallacy of relying on corporate social responsibility or anything less than meaningful legal reform to tackle plastic pollution. *Id.*

<sup>113</sup> Craig Anthony Arnold, *Fourth-Generation Environmental Law: Integrationalist and Multimodal*, 35 WM. & MARY ENV’T L. & POL’Y REV. 771, 771 (2011).

<sup>114</sup> A growing number of studies are illustrating the positive effects of plastic bans on plastic bag usage. See Yong Li & Bairong Wang, *Environmental Motivation or Economic Motivation? Explaining Individuals’ Intention to Carry Reusable Bags for Shopping in China*, 13 FRONTIERS PSYCHOL., Nov. 2022, at 2 (showing that a growing number of studies are illustrating the positive effects of plastic bans on plastic bag usage).

<sup>115</sup> Nøklebye et al., *supra* note 95, at 224 (concluding bans have added considerably to public awareness).

<sup>116</sup> See Karrigan S. Börk, *An Evolutionary Theory of Administrative Law*, 72 SMU L. REV. 81, 81 (2019).

world, including the E.U. and developing nations such as India, have taken steps towards banning single-use plastics.<sup>117</sup> Plastic producers are looking to parts of the developing world to increase the consumption of plastic, particularly single-use plastic, which would build in a continuing need for new production.<sup>118</sup>

There is a synergistic role of bans in connection with their shaping of public opinion.<sup>119</sup> Public opinion forms the basis for local bans, but opinion is also shaped by bans. American consumers largely believe that products sold for use in a home are safe.<sup>120</sup> It has taken many years of educational campaigns and media attention to reach the point we are at where consumers generally report a concern about plastic use and pollution and are demanding legal change.<sup>121</sup> Ten common plastic items account for seventy-five percent of the plastic garbage littering our environment.<sup>122</sup> The top four of those are commonly used consumer products—single-use plastic bags, bottles, food containers and wrappers.<sup>123</sup>

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<sup>117</sup> See Godfrey, *supra* note 96, at 2.

<sup>118</sup> See MARI WILLIAMS, RICH GROWER & JOANNE GREEN, NO TIME TO WASTE: TACKLING THE PLASTIC POLLUTION CRISIS BEFORE IT'S TOO LATE 3 (2019) [https://assets.tearfund.org.au/files/TEAR\\_Report\\_No-Time-To-Waste.pdf#\\_gl=1\\*1gq28cc\\*\\_gcl\\_au\\*Ntc3NDMyMzQzLjE2OTA2NDQ1NzM.](https://assets.tearfund.org.au/files/TEAR_Report_No-Time-To-Waste.pdf#_gl=1*1gq28cc*_gcl_au*Ntc3NDMyMzQzLjE2OTA2NDQ1NzM.) [https://perma.cc/SY9U-MJEV] (noting the expanding use of single-use plastics around the globe, in particular in places unable to manage the waste problem).

<sup>119</sup> See Yong Li & Bairong Wang, *Go Green and Recycle: Analyzing the Usage of Plastic Bags for Shopping in China*, 13 INT'L J. ENV'T RSCH. & PUB. HEALTH, no. 23, 2021, at 7.

<sup>120</sup> Rachel Rabkin Peachman, *Is this Safe to Buy? How Dangerous Products Get—and Stay—On the Market*, CONSUMER REPS., (May 4, 2021), <https://www.consumerreports.org/product-safety/is-this-safe-to-buy-how-dangerous-products-get-and-stay-on-the-market-a8886455329/> [https://perma.cc/2WQU-WVVF] (relying on surveys to indicate that most Americans surveyed (ninety-six percent) believed products sold for home use had to adhere to various safety standards).

<sup>121</sup> See generally Emily Cowan, Andy M. Booth, Andreas Misund, Katja Klun, Ana Rotter & Rachel Tiller, *Single-Use Plastic Bans: Exploring Stakeholder Perspectives on Best Practices for Reducing Plastic Pollution*, 8 ENVIRONMENTS, no. 8, 2021, at 2 (noting consumer awareness of plastic pollution problem can be partly attributed to media attention and is expressed as the rise of citizens participating in beach cleanup days all around the world).

<sup>122</sup> See Isabella O'Malley, *These Ten Plastic Products Account for 75% of All Litter Items in the Ocean*, WEATHER NETWORK (June 22, 2021, 10:55 AM), <https://www.theweathernetwork.com/ca/news/article/these-ten-plastic-products-account-for-75-of-all-litter-items-in-the-ocean> [https://perma.cc/43FX-8K7A] (highlighting the findings in a study of innovative solutions to address marine litter); see also Nikoleta Bellau, Chiara Gambardella, Konsantinos Karantzas, João Gama Monteiro, João Canning-Clode, Stephanie Kemna, Camilo A. Arrieta-Giron, & Carsten Lemmon, *Global Assessment of Innovative Solutions to Tackle Marine Litter*, 4 NAT. SUSTAINABILITY 516 (2021).

<sup>123</sup> Morales-Caselles et al., *supra* note 27. The authors proposed several solutions but advocate regulatory bans on avoidable take-out products due to waste avoidance being the most effective way to minimize litter. *Id.* at 490.

Furthermore, it is clear that bans and the public media campaigns which have pre-dated some of them, have led to innovation and focus on new materials, such as plastic replacements. The World Economic Forum describes some innovation among companies seeking to improve upon the unnecessary plastic packaging including: (1) direct elimination, realizing that unnecessary plastic could simply be forgone; (2) innovative elimination, where things like plastic rings around cans were replaced by glue, water soluble films, and edible coatings on food; (3) refills; or (4) return and reuse systems.<sup>124</sup>

Banning plastic item by item is not only an incremental approach that highlights policymaker's risk-benefit calculation in a stark manner, but a large step forward in reducing the sheer volume of production. San Francisco's 2007 plastic bag ban acted as a catalyst for other government efforts to restrict plastic. The result of which is that there is now a significant experience with local and state plastic bans. The items discussed in Part III below on history of bans in environmental law up to this point— asbestos, lead, mercury, DDT—have inherently dangerous properties. And although some components of plastic are themselves toxic, it is the relatively innocuous nature of plastic that has been its very hallmark of utility. Yet this perception also contributes to its massive accumulation and interferes with our progress as a society. Plastic, and single-use plastic items in particular, have a major design flaw—they do not break down in the environment. Thus, it is only by banning production of items that are designed to be used once but then last forever that we can avoid this design flaw.

### III. PLASTIC BANS IN THE U.S.

This Part examines specific plastic bans adopted by local and state legislatures in the U.S. and introduces the currently contested legal landscape where *bans on* plastic bans have proliferated. Bans can act in a two-fold manner. First, the accumulation of bans on products can create a tipping point that forces innovation and change. Second, the bans themselves influence public perception of the risk of plastic exposure, and these perceptions ultimately pressure the producers of these consumer products to adapt.

The practicality of a ban on plastic may seem low given the expansive use of plastic in everyday life. Frequently, the analysis of the plastic pollution problem starts from the stark reality that plastic is ubiquitous in modern life. But the harmful effects of plastics have pierced the public consciousness. One in five people globally are already subject to some form of tax, mandate, or restriction on plastic usage. Increasingly, people voluntarily reject single-use plastic items such as bottled water, cups, straws, and take-out containers; opting instead to bring their own reusable versions or to go without altogether. This movement caused commentators to

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<sup>124</sup> Thornton, *supra* note 99. *Will 2018 Be the Year of the Single-Use Plastic Ban?*, SISKINDS LLP BLOG (Mar. 1, 2018), <https://www.siskinds.com/envirolaw/single-use-plastics-ban/> [<https://perma.cc/GGC9-PMH8>] [hereinafter *Year of the Single-Use Plastic Ban?*].

wonder if 2018—before the COVID 19 pandemic—would be the year of single use plastics bans.<sup>125</sup>

For a significant period of time, activists focused on the plastics pollution problem have highlighted the need for educating the public.<sup>126</sup> Like any pollution issue, much of the harm from pollution is “invisible,” meaning individuals do not immediately comprehend the cumulative impact of discarded materials in the aggregate.<sup>127</sup> Because the theory of harm underpins environmental regulation, the concept is to raise public awareness so that individuals will demand harm and risk mitigation. The failure of our regulatory system to capture aggregate harm explains many of our most critical environmental crises—climate change, biodiversity collapse, and plastic pollution.

One way to conceptualize the actions of local and state governments is to see them in the role as choice architects. “Nudges” have been popularized as an approach to direct people toward certain actions while retaining choice autonomy. The insights are drawn from behavioral economics and can include things like “green default rules” such as not providing a plastic straw unless a customer requests it, and strong messaging about the harmful impact of plastic on wildlife and the environment.<sup>128</sup> These default rules require consumers to actively choose to use plastic. They may also influence a consumer to avoid plastic once they understand its harmful impacts. By contrast, as Professor Sarah Morath explains, nudges are short of “regulating” behavior and allow consumers to still make decisions for themselves.<sup>129</sup> Educational campaigns are also seen as “nudges.”

These short-of-regulatory efforts have failed to curtail plastic pollution. Jurisdictions that have adopted bans, in one form or another, are seeking to push consumer behavior in a particular sustainable direction by automatically reducing plastic consumption. Although bans are criticized for impacting consumer choice, they are more effective at targeting upstream production. In response, many states have stepped in to preempt local governments from using this stronger policy tool.

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<sup>125</sup> *Year of the Single-Use Plastic Ban?*, *supra* note 124.

<sup>126</sup> See Kishor Dere, *Mobilizing World Public Opinion Against Use of Plastic Products*, 57 CAL. W.L. REV. 81, 111 (2020) (asserting the futility of bans and regulations in face of consumer demand); see also Jennie R. Romer & Leslie Mintz Tamminen, *Plastic Bag Reduction Ordinances: New York City’s Proposed Charge on All Carryout Bags as a Model for U.S. Cities*, 27 TUL. ENV’T L.J. 237, 255 (2014) (emphasizing the need for education so that customers reduce their consumption and increase use of reusable bags).

<sup>127</sup> See Doris Knoblauch, Linda Mederake & Ulf Stein, *Developing Countries in the Lead—What Drives the Diffusion of Plastic Bag Policies?*, 10 SUSTAINABILITY, no. 6, June, 2018, at 1–2 (discussing the change in attitudes over the sustainability of plastic bags and noting that in the developing world, the destructive impact of plastic waste has been far more visible—littering roadways and clogging sewer systems).

<sup>128</sup> See Cass R. Sunstein & Lucia A. Reisch, *Automatically Green: Behavioral Economics and Environmental Protection*, 38 HARV. ENV’T L. REV. 127, 133–38 (2014) (emphasizing default rules in favor of the most sustainable option).

<sup>129</sup> Sarah J. Morath, *Our Plastic Crisis*, 33 NAT. RES. & ENV’T 45, 48 (2019).

*A. Banning Plastic Bags*

California has long been at the vanguard of environmental protection and was the first of the U.S. states to pass a law to “ban” plastic bags.<sup>130</sup> SB 270 outlawed certain retailers from providing free single use plastic bags by 2015. In fact, SB 270 was modest regulation, not a true “ban” as it carried multiple exceptions and a detailed regulatory approach.<sup>131</sup> Nonetheless, this was a strong influence by choice architects to push the public away from selecting single-use plastic bags. The ban originated in the legislature. However, opponents sought to stop the legislation from taking effect, and brought a referendum demanding that voters rescind the ban. This effort resulted in California voters upholding the statewide ban, which then took effect in November 2016. Thus, although the legislature, the original architect of the choice, was informed by a large body of evidence of the relative pros and cons of plastic bag availability, it was ultimately the citizens who determined to impose this limitation on public choice (essentially a tax on bags) upon themselves and their fellow citizens.<sup>132</sup>

The statewide ban in California in fact had a precursor of local efforts to curb plastic bag use. In 2007, San Francisco became the first city in the U.S. to implement a ban on single-use plastic bags.<sup>133</sup> In Southern California, the city council in Manhattan Beach moved to restrict plastic bag use. In response to the local ordinances, industry groups sued and argued that environmental impacts would result from the ban due to an increase in the use of paper bags.<sup>134</sup> One explanation for the intense resistance by the plastic bag industry is that some see the movement against plastic bags itself—although only a small portion of overall plastic in our economy—as a significant step toward limiting plastics use more broadly. “The seriousness with which the plastics industry is taking environmentalists['] attempts

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<sup>130</sup> Nora Shafie, *Banning Plastic Bags*, GEO. INT’L ENV’T L. REV. ONLINE (Nov. 10, 2014), <https://gielr.wordpress.com/2014/11/10/banning-plastic-bags/> [<https://perma.cc/6PN6-RGJC>].

<sup>131</sup> Qiying Zhu, *The California Plastic Bag Ban: Where Do We Go from Here?*, 5 ARIZ. J. ENV’T L. & POL’Y 1053, 1055–56 (2015).

<sup>132</sup> California has continued its strong efforts to tackle plastic pollution with landmark legislation in 2022. The Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB 54), initially a bill introduced in 2020 that failed to make it through the legislature, finally passed and became law in June 2022. The law requires that all packaging be recyclable or compostable by 2032, demands a twenty-five percent reduction of plastic in single-use products by 2032, and sets additional targets for reduction: thirty percent of packaging recycled by Jan 1, 2028; forty percent by Jan. 1, 2030, and sixty-five percent by Jan 1, 2032. S.B. 54, CAL. PUB. RES. CODE. §§ 41821.5, 42040, 42064 (2022).

<sup>133</sup> Stephanie Grissom, Comment, *The Urban Tumbleweed: An Analysis of Single-Use Plastic Bag Regulations and the Battle over Local Control*, 50 TEX. TECH L. REV. 759, 762 (2018).

<sup>134</sup> *Save the Plastic Bag Coal. v. City of Manhattan Beach*, 254 P.3d 1005, 1008–10 (2011).

to restrict plastic bags demonstrates that this is a ‘tipping point’ issue for the plastics industry, and the battle is far from over.”<sup>135</sup>

Other localities have also adopted bans on plastic bags.<sup>136</sup> This incremental approach to eliminating plastic bags has led to first- and second-generation bag bans over time with differing scopes. This iterative approach allowed local governments to learn from the lessons of others that adopted bans on plastic bags. In fact, some local bans are actually more like taxes, where stores cannot provide the bags for free.<sup>137</sup> Connecticut decided to adopt a single-use bag tax of ten cents, with a ban on bags phased in later.<sup>138</sup> Other regulatory “bans” require that businesses that do give plastic bags also provide recycling options at the same location.

Critics of these bans point to several concerns. First, some identify a concern with increase in foodborne illnesses.<sup>139</sup> Those that look at materials’ life cycles question the wisdom and tradeoff in energy and resource consumption that plastic switching may create (e.g., going from plastic to paper bags).<sup>140</sup> Paper bags are also manufactured with chemicals that can harm the environment. Further, paper bags are made from pulp that requires logging of trees from forests, an activity that must be regulated to minimize harm to wildlife and other environmental amenities such as water resources. Also, as discussed in a subsequent Part, there are opportunities to recycle plastic bags that may be less impactful to the environment compared with recycling paper bags. However, the current infrastructure for recycling belies the

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<sup>135</sup> Romer & Foley, *supra* note 22, at 378.

<sup>136</sup> Grissom, *supra* note 133, at 761.

<sup>137</sup> Plastic policies have demonstrated that sometimes taxes are effective in changing behavior. Studies demonstrate that after a tax on plastic bags in Ireland consumption decreased by ninety-four percent, Denmark’s tax produced a sixty-six percent drop in plastic bags, and in Portugal usage decreased by seventy-four percent. *See* Li & Wang, *supra* note 114, at 2.

<sup>138</sup> H.B. 7424, 2019 Leg., (Conn. 2019); *see* Kathleen Megan and Maya Moore, *A Win on Plastic Bags for Environmentalists; Not So on Bottles, Plastic Straws*, CT MIRROR (June 4, 2019), <https://ctmirror.org/2019/06/04/a-win-on-plastic-bags-for-environmentalists-not-so-on-bottles-plastic-straws/> [<https://perma.cc/J9VN-Z2Y5>] (noting that although the legislature addressed plastic bags other legislation dealing with the waste stream from bottles and plastic straws did not pass).

<sup>139</sup> Jonathan Klick & Joshua D. Wright, *Grocery Bag Bans and Foodborne Illness*, U. PA. INST. FOR L. & ECON., 1 (2012) (Paper No. 13-2); E. Frank Stephenson, *Persecuting Plastic Bags*, in FOR YOUR OWN GOOD: TAXES, PATERNALISM, AND FISCAL DISCRIMINATION IN THE TWENTY-FIRST CENTURY 119, 355–56 (Adam J. Hoffer & Todd Nesbit eds., 2018).

<sup>140</sup> In general, the debate is framed as the lifecycle of recycling paper products compared to the lifecycle of recycling plastic. *See generally* Chris Strobel, *Paper or Plastic? The Importance of Effective Environmental Review of Ordinances Regulating the Use of High Consumption Consumer Products*, 19 J. ENV’T & SUSTAINABILITY L. 213 (2012) (discussing the Manhattan Beach Case). Yet, what this debate avoids is the potential for innovation to create new products with reduced environmental footprints, or the change in behaviors that consumers adopt when prodded effectively by incentives to act in more sustainable patterns. *See also* Sunstein & Raich, *supra* note 128.

argument that recycling plastic bags is environmentally beneficial. Minimal recycling occurs under the current regulatory system, leading to the term “wisheycling.”

There are also those that argue plastic bags have been unfairly targeted, in that the harm they cause is not equivalent to the regulatory focus.<sup>141</sup> For example, E. Frank Stephenson argues that “[e]ven if, relative to available alternatives, plastic shopping bags do increase carbon emissions, increase litter, harm wildlife, or consume landfill space, efficient policy requires setting the per bag fee equal to the marginal damage associated with each bag.”<sup>142</sup>

Although Professor Stephenson is also concerned with unintended consequences, he compares the reaction to plastic bags with the relative lack of attention to consumer containers and other plastic products. This argument misses the mark when one considers the movement against convenience plastic items as a broader set of actions that must be taken to address the multiple inputs of plastic garbage into the environment. Moreover, it is not clear the harm can be so easily monetized and passed on to the consumer. And since Prof. Stephenson addressed the issue, a multitude of other bans at both state and national level have indicated it is far from paternalism driving the restriction. Indeed, more than ninety countries have enacted “legislative intervention” to address plastic bags, most commonly single-use plastic shopping bags, at either the national, regional, or local level.<sup>143</sup> The mismanagement of plastic has risen to the top of lawmakers’ agendas, driven by concern for economic impacts as well as the human health and environmental harms.<sup>144</sup>

In fact, concern about waste management of plastic dates far before this recent focus on plastic bags. In Minnesota, the legislature decided to ban single-use, non-

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<sup>141</sup> See Stephenson, *supra* note 139, at 354. A broader dispute about the focus on plastic pollution during a time when global crises from climate change and a human induced extinction is also relevant, however there is fairly broad agreement regarding the relative threat of plastic to our oceans. See generally Richard Stafford & Peter J.S. Jones, *We Should Not Separate Out Environmental Issues, but the Current Approach to Plastic Pollution Can Be a Distraction from Meaningful Action. A Response to Avery-Gomm et al.*, 107 MARINE POL’Y., no. 3, Sept. 2019, at 1–2. The authors point out that many environmental problems have a through-line that overconsumption drives the most urgent crises of climate change, biodiversity loss, and now plastic pollution as well. However, they emphasize that the framing of the problem tends to “pressure individuals to solve these problems” and rely on market-responses and other neo-liberal responses that are too weak to address the scope of the problems. *Id.* at 2.

<sup>142</sup> Stephenson, *supra* note 139, at 354.

<sup>143</sup> See Qinbin Wang, Angela Tweedy & Helen G. Wang, *Reducing Plastic Waste Through Legislative Interventions in the United States: Development, Obstacles, Potentials, and Challenges*, 2 SUSTAINABLE HORIZONS, no. 6, Mar. 2022, at 1.

<sup>144</sup> See generally Avalon Diggle & Tony R. Walker, *Environmental and Economic Impacts of Mismanaged Plastics and Measures for Mitigation*, 9 ENVIRONMENTS, no. 15, 2022, 9–13, 20 (detailing the economic costs of plastic pollution including government sponsored cleanups, impacts on fishing, and lost tourism). The authors examine extended producer liability as one policy solution in response to failed recycling efforts.



refillable plastic milk jugs. However, the market at the time was already dominated by single-use, non-refillable paper product cartons. In a 1981 Supreme Court Case, *Minnesota v. Clover Leaf Creamery Co.*, the court upheld the Minnesota law and rejecting an equal protection claim against the ban. The Supreme Court recognized that a ban against plastic cartons that were conceded to cause environmental problems was a legitimate concern of the Minnesota legislature.<sup>145</sup>

Many years of education campaigns have failed to bring needed change, and, moreover, serve to re-emphasize the fallacy that simply changing individual behavior can solve the marine debris and plastic pollution crisis. It cannot. Banning plastic is a timely and graduated response to failed nudges. The weak policy approach to date could itself minimize the issue of plastic pollution. According to Cass Sunstein, nudges might fail for a variety of reasons.<sup>146</sup> These include causing confusion among the intended audience, causing a “reactance” by the audience, or causing “compensating behavior, resulting in no net impact.”<sup>147</sup> And, in return, Sunstein suggests three potential responses: “(1) do nothing; (2) nudge better (or differently); and (3) fortify the effects of the nudge, perhaps through counter-nudges, or perhaps through incentives, mandates, or bans.”<sup>148</sup> Current efforts indicate that a ban on using plastic products would achieve many benefits. Scholars and policymakers are now keenly focused on how, given our experience and despite skeptics that contend otherwise, bans can be implemented to avoid unintended consequences or unfairly impact more vulnerable individuals.

### *B. Banning Microplastics in Cosmetic Products*

Not all banning efforts have been contested by industry. For example, microplastics intentionally added to cosmetic products are being phased out in the U.S. and were similarly banned in the U.K. These small beads of plastic, intended to be exfoliants, are too small to be filtered out by sewage systems.<sup>149</sup> Thus, as the products were used by households the small pieces of plastic were washed-off and drawn into sinks and shower drains during their intended use. Our rivers, lakes, and oceans were polluted by the plastic-laden runoff.

The issue was addressed by the 114th Congress with the Microbead-Free Waters Act (“MFWA”) of 2015, signed into law by President Obama.<sup>150</sup> The MFWA defines a plastic microbead as any solid plastic particle “less than 5 millimeters in size” and intended to be used to exfoliate or cleanse the body or any part of the body.<sup>151</sup> The law provided a phase-out period, with deadlines intended to give manufacturers the ability to make needed changes in formulations and to give

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<sup>145</sup> See *Minnesota v. Clover Leaf Creamery Co.*, 449 U.S. 456, 470 (1981).

<sup>146</sup> Cass R. Sunstein, *Nudges that Fail*, 1 BEHAV. PUB. POL’Y 4, 4 (2017).

<sup>147</sup> See *id.*

<sup>148</sup> *Id.*

<sup>149</sup> See Rachel Doughty & Marcus Eriksen, *The Case for a Ban on Microplastics in Personal Care Products*, 27 TUL. ENV’T L.J. 277, 278 (2014).

<sup>150</sup> See generally The Microbead-Free Waters Act, H.R. 1321, 114th Cong. (2015).

<sup>151</sup> See 21 U.S.C. §331(ddd)(2)(A).

distributors and retailers the opportunity to sell inventory before the ban becomes effective.<sup>152</sup> The law represented a culmination of a multi-stakeholder effort to ban the future production of microbeads, including non-governmental organizations and the plastics industry, lead in part by the American Chemistry Council.<sup>153</sup> The lawmaking process was described by one expert as “a bipartisan effort, supported by industry stakeholders and non-profit organizations alike.”<sup>154</sup>

The most impactful part of the law is the total ban on the manufacturing, packaging, and distribution of rise-off cosmetics containing plastic microbeads. However, even prior to the MFWA’s passage, many states had already decided to ban these products, meaning the law’s main advantage was addressing an uneven regulatory landscape. Although some have drawn the conclusion that the effort is an example of successfully engaging the plastic industry to achieve a success, it is more likely relevant that many states had already banned microbeads, markets in the U.K. had moved in this direction, and manufacturers of these cosmetic products had ready access to replacement materials.

### C. Banning Plastic Straws

Single-use straws are another consumer product that has caused visible harm to wildlife. An environmental film featuring sea turtles impacted by straws galvanized a movement to ban single-use plastic straws.<sup>155</sup> There are now bans in various states and localities.<sup>156</sup> Straw bans, like bag bans, have various iterations. In some jurisdiction straws are flatly prohibited.<sup>157</sup> Other jurisdictions have banned straws

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<sup>152</sup> See generally Sarah Kettenmann, *Nationwide Ban on Plastic Microbeads in Cosmetics*, 31 NAT. RES. & ENV’T 58, 59 (2016); Microbead-Free Waters Act of 2015, Pub. L. 114–114, §2(b), 129 Stat. 3129.

<sup>153</sup> See generally David A. Strifling, *The Microbead-Free Waters Act of 2015: Model for Future Environmental Legislation, or Black Swan?*, 32 J. LAND USE & ENV’T L. 151, 151 (2016) (examining building blocks of success for future legislation). Although the author notes that there was wide support of stakeholders and industry, he argues the success was partially attributable to the narrow scope of the bill and orientation as a “health” bill. *Id.* at 161–64.

<sup>154</sup> Kettenmann, *supra* note 152.

<sup>155</sup> See Dayna Smith, *The Final Straw?: Evaluating Possible Challenges to Single-Use Plastic Straw Bans*, 50 TEX. ENV’T L.J. 331, 331–32 (2020) (explaining how a movement against straws was sparked by a viral turtle video, although turtles are not the only marine life impacted by plastic pollution); see also Duncan J.J. Kessler, Comment, *Plastic Straw Bans Can Run Afoul of the Americans with Disabilities Act*, 69 AM. U.L. REV. F. 1, 7–8 (2019) (discussing the movement for straw bans including video of turtle with straw up its nose and celebrities and organizations pushing for change).

<sup>156</sup> See, e.g., Marguerite Moloney, *Flawlessly Strawless?*, 31 FORDHAM ENV’T L. REV. 107, 112–13 (2020) (discussing straw bans in California, Seattle, Washington, and other places outside the United States).

<sup>157</sup> See Kessler, *supra* note 155, at 9–11. Bans in places like Malibu, California, Monmouth Beach, New Jersey and Seattle, Washington are examples of bans that were drafted to flatly prohibit restaurants and businesses from providing plastic straws. *Id.*

but provided exemptions from the prohibition, while still others seek to restrict the distribution of plastic straws by requiring that customers request them before a business provides them.<sup>158</sup>

The alternatives to plastic straws have multiplied. Metal, paper and even the non-single use plastic silicone straws are now popular consumer items. Many corporations are pledging to eliminate straws from their stores, with Starbucks as a highly visible example.<sup>159</sup> Sub-national political entities in other countries, such as provinces in Canada, are already moving forward with bans on straws.

On January 1, 2021, China banned single-use plastic straws, and stores in major cities were banned from providing plastic shopping bags. When China banned straws and other single use utensils, a market for alternatives made of other materials emerged. To name a few materials now beginning to take over the existing demand in China, straws are now made from rice, wheat product, and paper.

#### *D. The Growing Ban on Plastic Bans*

Despite the attempts to ban unnecessary plastic at the local level, some states have affirmatively preempted plastic bans.<sup>160</sup> One explanation given for preemption is to protect individual choice and allow businesses to make decisions for themselves.<sup>161</sup> The federal government may need to intervene to allow continued efforts to ban plastic products at the local level in states where the legislature is seeking to protect the plastic industry from regulation.<sup>162</sup> States such as Texas, Oklahoma, North Dakota, Idaho, and Florida have laws in place that prevent local governments from protecting their communities from plastic pollution through bans on plastic bans.<sup>163</sup> Business interests have often been successful in agitating for state-wide regulation to avoid a patchwork of different rules throughout a state. For

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<sup>158</sup> *See id.* at 10–13 (explaining bans with exemptions exist in San Francisco, Santa Barbara, and Washington, D.C., while a “request-only” law is in effect statewide in California).

<sup>159</sup> Moloney, *supra* note 156, at 117–28 (discussing motivations for straw ban by Starbucks).

<sup>160</sup> *See State Plastic and Paper Bag Legislation*, NAT’L CONF. OF STATE LEGISLATURES (Feb. 8, 2021), <http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx> [<https://perma.cc/L5FHTUYW>] (noting states that have preempted bag ordinances including Arizona, Colorado, Iowa, Idaho, Indiana, Florida, Minnesota, Michigan, Mississippi, Missouri, North Dakota, Oklahoma, Tennessee, Texas and Wisconsin); *see also* Madison Guyton, *Ban on Bans: Plastic Bags, Power, and Home Rule in South Carolina*, 71 S.C. L. REV. 801 (2020).

<sup>161</sup> Morath, *supra* note 129, at 48.

<sup>162</sup> *See generally* Ethan D. King, *State Preemption and Single Use Plastics: Is National Intervention Necessary?* 20 SUSTAINABLE DEV. L. & POL’Y 31 (2019). Some states have not only preempted bans, but any form of regulation including bans, fees, or recycling programs. *Id.* On the other hand, some states, such as New York and Maine, have required that stores which use plastic bags must also have recycling programs outside their business locations. *Id.*

<sup>163</sup> *Id.*

example, the city of Laredo, Texas adopted a ban on plastic bags. Texas state law prohibited any regulation of solid waste and the Texas Supreme Court determined that plastic bags were considered garbage, thus striking down the local ban on plastic bags.<sup>164</sup> This effectively put an end to similar bans across municipalities in Texas. Although a bill was introduced in the state legislature to exempt plastic bags from the definition of solid waste, the bill failed to move forward. Plastic litter continues to cause harm in Texas, with reports of it killing horses and cows across the state.<sup>165</sup>

These bans on plastic bags are a familiar response to local environmental protection efforts.<sup>166</sup> We see a similar trend of states seeking to preempt local attempts to regulate fracking.<sup>167</sup> Lawmakers in Wyoming have raised the possibility of banning electric vehicles to support the oil and gas industry in the state.<sup>168</sup> The landscape for plastic bans should be no surprise given the overlap of the fracking and plastic production industry—they are in fact the same entities.

### *E. Avoiding Unnecessary Plastic*

Although the rationale for eschewing bans for nudges such as education campaigns and charges is to provide consumer choice, many consumers are not empowered to reject unnecessary plastic in some settings. Grocery items like individually wrapped consumable products are one example. But other times plastic use and its threat to the environment is still invisible to the average consumer. For example, movement is afoot to educate people about microplastics in the fibers of our clothing that escape into our water during regular washings in a nearly identical manner as the microbeads banned from cosmetics.<sup>169</sup> Perhaps the newest group of

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<sup>164</sup> *City of Laredo v. Laredo Merchs. Ass'n*, 550 S.W.3d 586, 594–98 (Tex. 2018).

<sup>165</sup> Lara Korte, *Plastic Bags Are Killing Horses and Cows Across the State. What's Texas to Do?*, TEX. TRIB. (Aug. 14, 2019), <https://www.texastribune.org/2019/08/14/texas-wont-approve-bans-plastic-bags-which-can-be-fatal-livestock/>. [<https://perma.cc/G8YH-EJES>] (reporting that plastic litter has continued to proliferate and recounting a story of a colt swallowing a bag and suffocating).

<sup>166</sup> See generally Lauren E. Phillips, *Impeding Innovation: State Preemption of Progressive Local Regulations*, 117 COLUM. L. REV. 2225 (2017) (examining trend where local regulation of labor, antidiscrimination, and environmental protection has been preempted at the state level). As the author notes this effort contrasts with prior conservative expressed value to allow local government to address local concerns. *Id.* at 2227. The efforts are aided by model legislation and lobbying efforts by conservative organizations. *Id.*

<sup>167</sup> See Benjamin L. McCready, *Like It or Not, You're Fracked: Why State Preemption of Municipal Bans Are Unjustified in the Fracking Context*, 9 DREXEL L. REV. ONLINE 61 (2016).

<sup>168</sup> Natalie Neysa Alund, *Wyoming Lawmakers Push for Electric-Car Ban and to Limit Sales by 2035*, USA TODAY (Jan. 17, 2023, 1:46 PM), <https://www.usatoday.com/story/money/cars/2023/01/17/wyoming-ban-electric-vehicles-legislation/11067197002/> [<https://perma.cc/6JZ6-NYG4>].

<sup>169</sup> Jefferson Lai, *Microbeads Banned, but What About Microfibers?*, GEO. ENV'T L. REV. (Apr. 21, 2016), <https://gielr.wordpress.com/2016/04/21/microbeads-banned-but->

plastic consumer items targeted for elimination are decorative party items such as balloons and glitter. Sixty-one music festivals in the U.K. have banned the use of plastic glitter, and in response biodegradable glitter is now promoted as a replacement.<sup>170</sup> Packaging is another frequently discussed item for full restriction, given its significance as the highest volume single-use plastic waste product littering the environment.<sup>171</sup>

Some of the lessons we have learned are that the specifics of banning can make an important difference. Some bans have phase in periods that facilitate transition, both for businesses and consumers. Bans might initially start as a tax or are partial with many exemptions. While these efforts fall short of outright prohibiting the manufacture of certain plastic products, bans on common consumer products have raised awareness of the pollution problem and pushed consumers toward the adoption of alternatives. The whittling away at our plastic problem through these specific bans is a step in the right direction and helps to create the momentum for much broader necessary regulation.

#### IV. IMPORTANT BANS IN ENVIRONMENTAL LAW

Bans are a powerful policy response and they have been sparingly used in the U.S. or international environmental law. Mandates and bans are appropriate where individual behavior is insufficient to mitigate risk of harm. Product bans are often perceived as a strategy of last resort, and although they may spur innovation, are not employed unless the risks from the pollutant or activity are high.<sup>172</sup> Because they often target the most toxic materials, bans have been used most often in chemical and insecticide settings. Yet, this is not the only context where the benefits of banning can be discerned, and the details of how a product is completely eliminated are also relevant to using bans to chip away at the volume of virgin plastic production. This Part examines a number of prominent banning experiences gleaned from important lessons for the banning of unnecessary plastic.

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what-about-microfibers-georgetown-environmental-law-review/ [<https://perma.cc/WQ5C-KGEP>].

<sup>170</sup> See Chloe Street, *61 UK Music Festivals Are Banning Glitter. Here's Why It's Time to Switch to Biodegradable Sparkle*, EVENING STANDARD (Aug. 6, 2018), <https://www.standard.co.uk/beauty/music-festivals-ban-glitter-microbeads-microplastic-a3812661.html> [<https://perma.cc/HW4R-XM86>] (noting the festivals pledged to eliminate all single-use plastic from their events, including drink bottles, straws, and food trays, in addition to glitter, by 2021).

<sup>171</sup> Legislation such as SB 54 in California demonstrate increasing attention to eliminating unnecessary plastic packaging. S.B. 54, CAL. PUB. RES. CODE. §§ 41821.5, 42040, 42064 (2022).

<sup>172</sup> Robert M. Friedman, Donna Downing & Elizabeth M. Gunn, *Environmental Policy Instrument Choice: The Challenge of Competing Goals*, 10 DUKE ENV'T L. & POL'Y F. 327, 385 (2000).

### A. History and Experience with Bans

#### I. Consumer Product Safety Act

In 1972, Congress enacted the Consumer Product Safety Act (“CPSA”)<sup>173</sup> which enables the Consumer Product Safety Commission (“Commission”) to declare when a product is a “banned hazardous product.”<sup>174</sup> The definition of banned hazardous product is stark. The Commission must find that “a consumer product is being, or will be, distributed in commerce and such consumer product presents an unreasonable risk of injury” and “no feasible consumer product safety standard under this chapter would adequately protect the public from the unreasonable risk of injury associated with such product.”<sup>175</sup> When imposing consumer protection safety rules, the Commission has to determine “that the rule imposes the least burdensome requirement which prevents or adequately reduces the risk of injury.”<sup>176</sup>

In 2008, Congress banned the sale of children’s toys and childcare items that contained specified levels of three phthalates.<sup>177</sup> Phthalates are often used as a softener in plastics and were found in pacifiers and other common consumer products, like plastic food wrap and vinyl flooring.<sup>178</sup>

In 2015 the Commission banned an additional five phthalates. Industry soon challenged that ban for failing to follow proper procedure.<sup>179</sup> Although the court agreed with the manufacturer and chemical industry petitioners regarding violation of notice and comment procedures, it found that the Commission was not required to comply with the statute governing bans on hazardous products, did not exceed its statutory mandate to ensure reasonable certainty of no harm when it attempted to protect the 99th percentile from harm, and kept the ban in place remanding the case without vacating the rule.<sup>180</sup>

The Commission has not always fared so well in court. The Fifth Circuit, in *Gulf South Insulation v. CPSC*, struck down the Commission’s attempted ban on certain urea-formaldehyde foam insulations as “unsupported by substantial evidence.”<sup>181</sup> The court criticized the Commission’s methodology in reliance on certain studies, and the court found an “element of doubt” in the Commission’s dose-

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<sup>173</sup> Consumer Product Safety Act, Pub. L. No. 92-573, 86 Stat. 1207 (codified as amended at 15 U.S.C. §§ 2051–2089).

<sup>174</sup> 15 U.S.C. § 2057.

<sup>175</sup> *Id.* § 2057(1)–(2).

<sup>176</sup> *Id.* § 2058(f)(3)(F).

<sup>177</sup> *See id.* § 2057c.

<sup>178</sup> Meg Seymour, *What Are Phthalates and How Do They Affect Your Health?* NAT’L CTR. FOR HEALTH RSCH., <https://www.center4research.org/what-are-phthalates/> [https://perma.cc/53NS-Y79M] (last visited Aug. 29, 2023).

<sup>179</sup> *Tex. Ass’n of Mfrs., v. U.S. Consumer Prod. Safety Comm’n*, 989 F.3d 368, 372 (5th Cir. 2021).

<sup>180</sup> *See id.*

<sup>181</sup> 701 F.2d 1137, 1140 (5th Cir. 1983).

response assessment.<sup>182</sup> The case is a useful reminder of how a lack of protective orientation prevents stronger regulation of harmful products, and how legal challenges by industry seek to exploit this approach when there is imperfect information about health impacts from products on the market.

## 2. *Chemicals and Pesticides*

Although recently revised, a good example of the expression against using aggressive regulation is the Toxic Substance Control Act (“TSCA”). Before it was amended in 2016 (effective in 2017), case law interpreted the mandate of least burdensome method of regulation as making full-out bans off-limits if there was any less restrictive means of regulation that would reduce unreasonable risk to health.

For example, under the TSCA, the obvious danger of the neurotoxin lead still did not receive an immediate ban. In 1978, the federal government banned the specific consumer uses of lead-based paint.<sup>183</sup> Evidence indicated that children exposed to lead were suffering neurological issues detected by IQ and behavioral tests.<sup>184</sup> Prior to EPA’s ban, some states banned lead paint after recognizing its potential harm. However, despite the actions of the EPA and states, lead is still used in other products posing danger to children. To date, the Consumer Product Safety Commission conducts a program on lead in toys and activists continue to push to eliminate unnecessary and dangerous exposure to lead.<sup>185</sup> Additionally, lead was banned from gasoline to address air quality through the Clean Air Act. Given lead in gasoline was the greatest source of lead in the air, addressing its entry into the environment from that pathway was maximally impactful.<sup>186</sup>

A clear lesson from our attempt to address harm from lead is that with such a ubiquitous substance, multiple regulatory schemes play a role. Bans prevent additional lead from entering the environment through the medium of leaded gasoline or leaded paint. However, lead continues to be used in industrial

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<sup>182</sup> *Id.* at 1146.

<sup>183</sup> *Protect Your Family from Sources of Lead*, U.S. ENV’T PROT. AGENCY (May 15, 2023), <https://www.epa.gov/lead/protect-your-family-sources-lead> [<https://perma.cc/8FQB-LXDM>]; *see also* Lead-Based Paint Poisoning Prevention Act of 1971, Pub. L. No. 91-695, 84 Stat. 2078 (codified as amended at 42 U.S.C. § 4822(d)) (requiring the abatement of lead-based paint in public housing).

<sup>184</sup> Eleanor Klibanoff, *Lead Paint Was Banned 40 Years Ago. Why Is It Still a Problem in Pa. Cities?*, WHYY (Feb. 26, 2016), <https://whyy.org/articles/lead-paint-was-banned-40-years-ago-why-is-it-still-a-problem-in-pa-cities/> [<https://perma.cc/7R53-DF7J>].

<sup>185</sup> *See generally* GERALD MARKOWITZ & DAVID ROSNER, *LEAD WARS: THE POLITICS OF SCIENCE AND THE FATE OF AMERICA’S CHILDREN* (2013) (overviewing the history efforts to eliminate lead exposures); *Toy Safety Business Guidance & Small Entity Compliance Guide*, CONSUMER PROD. SAFETY COMM’N, <https://www.cpsc.gov/Business--Manufacturing/Business-Education/Toy-Safety-Business-Guidance-and-Small-Entity-Compliance-Guide> [<https://perma.cc/TF69-YGS6>] (last visited Aug. 17, 2023).

<sup>186</sup> ROBIN CRAIG, *ENVIRONMENTAL LAW IN CONTEXT* 585 (4th ed. 2015) (discussing regulation of lead from automobiles).

applications, regulated through the Clean Air Act as a listed criteria pollutant.<sup>187</sup> The legacy of lead pollution continues to create harm. Thus, the sooner we begin to address an offending substance the more opportunity to minimize the scope of cleanup and removal necessary.

Another example of an important ban involves the defoliant DDT, which caused such devastating harm to the environment that it was required to be removed from the U.S. market despite its prominence as the most widely used pesticide in the world at the time.<sup>188</sup> The EPA administrator moved to ban DDT in most uses and industry sued to nullify the EPA ruling, while in turn environmental plaintiffs moved to extend the Administrator's orders to any remaining uses.<sup>189</sup> The appeals were consolidated in the U.S. Court of Appeals for the District of Columbia.<sup>190</sup> The court upheld the EPA Administrator's ban on DDT, finding there was "substantial evidence" in the record to support the ban.<sup>191</sup> "At the time of the ban, alternative pesticides were available" and after the ban other pesticides were identified.<sup>192</sup> The court recognized the Administrator's efforts to facilitate effective uptake of alternatives, noting that the Administrator delayed the effective date of the order so that users could be educated in the proper use of alternative pesticides.<sup>193</sup> However, manufacturers could still market DDT in other parts of the world. This indicates a different perspective on the harm from use of DDT and the risk that the use has in comparison to other dangers faced in those countries such as malaria or crop failures.<sup>194</sup> However, it is also criticized as a form of dumping unsafe products into countries whose environmental framework is too weak to resist industry pressure, drawing a close analogy with the hazardous waste dumping practices for non-recyclable plastic products that have ultimately spurred changes in international

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<sup>187</sup> Review of the National Ambient Air Quality Standards for Lead, 81 Fed. Reg. 201, 71910 (Oct. 18, 2016) (to be codified at 40 C.F.R. pt. 50); *see also id.* at 591 (explaining that the EPA must establish National Ambient Air Quality Standards (NAAQS) for all criteria pollutants and states create implementation plans to reach the national standards); *id.* at 593, 614 (noting that NAAQS for lead were established in 1978 and were updated most recently in 2008 and the EPA retained the 2008 NAAQS in 2016).

<sup>188</sup> Ruth A. Hussey, *A Look Back at DDT*, E.P.A. J., Oct. 1975, at 9 (detailing the history of EPA's actions to cancel use of DDT).

<sup>189</sup> *See Env't Def. Fund, Inc. v. Ruckelshaus*, 439 F.2d 584 (D.C. Cir. 1971); *Env't Def. Fund, Inc. v. EPA*, 489 F.2d 1247 (D.C. Cir. 1973).

<sup>190</sup> *Env't Def. Fund, Inc. v. EPA*, 489 F.2d at 1249.

<sup>191</sup> *Id.* at 1250–57 (affirming that the EPA's qualified ban on DDT was within their discretion).

<sup>192</sup> Hussey, *supra* note 188, at 20 (discussing economic impacts of the cancellation and switching to alternatives).

<sup>193</sup> *Env't Def. Fund, Inc.*, 489 F.2d at 1250.

<sup>194</sup> Don Mayer, *The Precautionary Principle and International Efforts to Ban DDT*, 9 S.C. ENV'T L. J. 135, 136–38 (2002) (using the precautionary principle to examine the question of whether to ban DDT from all uses worldwide); Ashley K. Martin, *The Regulation of DDT: A Choice Between Evils*, 41 VAND. J. TRANSNAT'L L. 677, 677 (2008) (noting that DDT causes irreparable harm to the environment but is effective against the spread of malaria and examining how to eliminate both use of the chemical and malaria).



hazardous waste laws. Ultimately, the experience from DDT illustrates that facilitating consumer uptake of alternatives to a harmful but useful product is possible. And moreover, new alternatives might even enter the market once a ban is in place.

### 3. *Montreal Protocol on Substances that Deplete the Ozone Layer*

The ozone hole caused by ozone-depleting substances also provides an example of an effective ban, with chlorofluorocarbons (“CFCs”) and hydrofluorocarbons (“HFCs”) removed as other market products could take the place of refrigerants.<sup>195</sup> CFCs were discovered in the 1930s and began to be widely used.<sup>196</sup> However, in the 1970s, a group of scientists theorized that CFCs migrated slowly into the stratosphere, where they were broken down by solar radiation.<sup>197</sup> Once broken down, the chemicals released large quantities of chlorine.<sup>198</sup> Studies demonstrated that even a single chlorine atom could eliminate tens of thousands of ozone molecules. CFCs were initially believed to be entirely safe, carefully tested by scientists.<sup>199</sup> The theory could not be proved definitively, nevertheless the international community moved to regulate despite the scientific uncertainty and the idea that the ozone depletion theory was both “an economic as well as environmental bombshell.”<sup>200</sup> Much like plastic, the harm was not perceived from the immediate use, but the accumulation of the substance in the stratosphere and its interactions within the environment that posed a risk to humanity.

Many have extolled the virtues of the Montreal Protocol as an effective and future-proofing regulatory measure.<sup>201</sup> The collective action of multiple nations was able to stave off the harm to the ozone which would have occurred with the continued emission of ozone depleting substances. But the protocol was not a one-off adoption, and refinement through iterations adopting more effective schedules for implementation was critical to success.<sup>202</sup> Moreover, the U.S. through the TCSA banned the use of CFCs as aerosol propellants in nonessential applications.<sup>203</sup> The

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<sup>195</sup> 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, 16 Sept. 1987, 26 I.L.M. 1541.

<sup>196</sup> RICHARD E. BENEDICK, *OZONE DIPLOMACY* 10 (1991).

<sup>197</sup> *Id.*

<sup>198</sup> *Id.*

<sup>199</sup> STEPHEN MCCAFFREY & RACHAEL SALCIDO, *GLOBAL ISSUES IN ENVIRONMENTAL LAW* 127 (2009).

<sup>200</sup> BENEDICK, *supra* note 196, at 11.

<sup>201</sup> See generally Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENV'T L. REV. 1 (2007) (contrasting the success of the Montreal Protocol with the Kyoto Protocol).

<sup>202</sup> Anne Gallagher, *The “New” Montreal Protocol and the Future of International Law for Protection of the Global Environment*, 14 Hous. J. INT'L L. 267, 326–27 (1992) (discussing the importance of a tightened control schedule in the 1990 amendments).

<sup>203</sup> Sunstein, *supra* note 201, at 11. See also 43 Fed. Reg. 11301 (Mar. 17, 1978) (codified at 21 C.F.R. §2.125).

Montreal Protocol was put in place prior to complete understanding of the full scale of potential harm. Although the science is growing on the full extent of harm of plastic pollution, we can learn from experience with the Montreal Protocol. Namely, it is critical to act before complete certainty is reached. In doing so, we can begin to eliminate unnecessary plastic production and the many consequences of plastic accumulation.

#### 4. *Minamata Convention on Mercury*

Methylmercury, a form of liquid mercury, bioaccumulates in fish and shellfish and can pose a serious health danger if consumed.<sup>204</sup> The EPA estimates that seventy percent of mercury deposited in the U.S. is produced from global sources.<sup>205</sup> Local sources create a global concern as mercury moves with air and water.<sup>206</sup> In the U.S., various industrial processes result in these harmful mercury emissions.

In 2013, the U.S. signed an international agreement aimed at reducing the global pollution of mercury.<sup>207</sup> This agreement—the Minamata Convention—requires the phase-out or reduction of mercury in products such as “batteries, switches, lights, cosmetics, pesticides and measuring devices.”<sup>208</sup> The Minamata Convention on Mercury is a partial whittling away of the harms posed by mercury. There still exist many avenues to address the deposition of mercury occurring through industrial processes. This itself is a lesson for plastics regulation. We should not pass up the opportunity to ban plastic applications that are trivial in nature, given the scope of the ubiquity of plastic in the economy.

#### B. *Citizen Concern for Government Overreach*

Regardless of these successful examples, the fact remains that bans are highly disfavored due to the perception of over-regulation of businesses, and concomitant arguments against restriction of consumer choice. Dangerous products are frequently regulated by quality control standards, labeling, and restrictions on sub-populations. Although environmental law in the U.S. has provided some of the highest achievements in terms of following the rule of law and enforcing existing regulations to achieve pollution protection, it is not as strongly influenced by the

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<sup>204</sup> Joanne Rotondi & Kim Smaczniak, *The Minamata Convention on Mercury: What It Does and Does Not Mean for the United States*, 29 NAT. RES. & ENV'T 19, 19 (2014) (describing how seafood contamination of people living near the Japanese city Minamata spurred concern about mercury in the late 1950s).

<sup>205</sup> *Minamata Convention on Mercury*, U.S. ENV'T PROT. AGENCY (Dec. 12, 2022, <https://www.epa.gov/international-cooperation/minamata-convention-mercury> [<https://perma.cc/4P8P-GDSM>]).

<sup>206</sup> Rotondi & Smaczniak, *supra* note 204 (noting that once released mercury persists in the environment and can travel thousands of miles).

<sup>207</sup> Tseming Yang, *The Minamata Convention on Mercury and the Future of Multilateral Environmental Agreements*, 45 ENV'T L. REP. 10064, 10064 (2015).

<sup>208</sup> *Minamata Convention on Mercury*, *supra* note 205.

precautionary principle, thus typically limiting the responsiveness of regulation to newly emerging problems. Moreover, bans are rarely used. U.S. regulators typically opt for alternatives to the traditional command and control approaches from the first generation of environmental law as a perception of responsiveness to the public interest in consumer choice and robust economic development.

Americans express strong suspicion of government controls, which in turn finds expression within the field of environmental law. Some experts express the American approach to environmental regulation as form of balance—how to achieve regulation in balance with societal progress. Therefore, an enduring concern is what is the optimum level of regulation? One group of experts against plastic bans to address pollution extoll the virtue of recycling solutions instead of total bans. In *Plastic Pollution: Bans vs. Recycling Solutions*, the authors suggest municipalities should avoid bans for, among other reasons, economic impacts and negative impact on the environment and minorities.<sup>209</sup> Although some of these arguments, such as the negative impacts on minorities, border on specious in light of the environmental justice issues related to petrochemicals, these arguments are illustrative of the voices extolling the virtues of consumer choice and preference for economic mechanisms.<sup>210</sup>

Choice is offered as a euphemism for individual freedoms. Environmental law that constrains the addition of pollution into the environment has continued to conflict with economic and personal freedom arguments against their imposition—much like in the fields of air and water quality controls. Plastic regulation is no different. Ultimately, overcoming the resistance to stricter regulation requires instilling a recognition of the cost-benefit balance of preserving public goods (clean water, clean air, healthy wildlife) in relation to the individual and societal costs of limiting harmful activities. The spread of plastic bans without substantial public backlash has illustrated the opportunity for law and policymakers to engage in an area that is broadly supported by the public. In fact, recent polling has indicated that alongside climate change, members of the public have a grave concern about water quality and the impact of plastic on the environment.<sup>211</sup> Indeed, surveys now indicate that a significant percentage of consumers have a willingness to pay more to avoid

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<sup>209</sup> Katie Colton, Camille Harmer, Brian Isom, and William F. Shughart II, *Plastic Pollution: Bans vs. Recycling Solutions*, INDEP. INST. BRIEFING (2018).

<sup>210</sup> *Id.* Some concerns, including the need to accommodate those with disabilities such as ADA compliant plastic-bans raise relevant concerns. *See generally* Kessler, *supra* note 155, at 5. However, arguments that minorities will be harmed by curbing the expansion of plastic production facilities is a value judgment and a viewpoint that not all experts or the communities themselves share.

<sup>211</sup> *Survey Shows Broad Support for Reducing Plastic Pollution, Improving Recycling, and Holding Manufacturers Responsible*, PLASTIC POLLUTION COAL. (Jan. 27, 2021), <https://www.plasticpollutioncoalition.org/blog/2021/1/27/new-survey-shows-broad-public-support-for-reducing-plastic-pollution-improving-recycling-and-holding-manufacturers-responsible> [<https://perma.cc/UF4W-JPB4>].

plastic and want plastic-free choices.<sup>212</sup> Much like ubiquitous warnings about the hazards of items the government has already restricted or banned, a ban on unnecessary plastic items would be instrumental in changing public perception about plastic's harmful nature. As the discussion in this Part illustrates, we have banned harmful products before, and banning plastic is neither drastic or unprecedented but instead fits the demand of this particular environmental problem and is responsive to the public's concern for environment and human health.

### C. *Managing the Role of the Plastic Lobby*

A final challenge for adopting bans against plastic products comes from the corporations which profit from their continued use.<sup>213</sup> Plastic polymer production companies, many of which are oil companies (e.g., ExxonMobil), are employing a similar approach that was effective at staving off climate change regulation despite decades of evidence of its deleterious effects.<sup>214</sup> The same approach was also used to discredit the scientific evidence behind the ozone depletion and seek to slow or avoid regulation.<sup>215</sup> Due to the dominance of the utilitarian model of environmental governance design, it is important to anticipate and manage the challenge from misleading campaigns against banning efforts. Plastic banning efforts are criticized by the plastic lobby and others as unfairly restricting consumer choice. It is important to emphasize that appropriate plastic regulation is an issue of consumer protection because public support for local as well as state and national bans on plastic products will be important to ensure their success.

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<sup>212</sup> *Survey: Amazon Customers Overwhelmingly Concerned About Plastic Pollution, Want Plastic-Free Choices*, OCEANA, INC. (July 14, 2020), <https://www.globenewswire.com/news-release/2020/07/14/2061696/0/en/Survey-Amazon-Customers-Overwhelmingly-Concerned-About-Plastic-Pollution-Want-Plastic-Free-Choices.html> [<https://perma.cc/UF4W-JPB4>]; Laura Santhanam, *Most Americans Would Pay More to Avoid Using Plastic, Poll Says*, PBS (Nov. 26, 2019, 5:00 PM), <https://www.pbs.org/newshour/nation/most-americans-would-pay-more-to-avoid-using-plastic-poll-says> [<https://perma.cc/N6TM-86CQ>].

<sup>213</sup> See *Plastic Waste Makers Index*, THE MINDEROO FOUNDATION (2023) <https://www.minderoo.org/plastic-waste-makers-index> [<https://perma.cc/4UQ6-YNKL>] (showing the top plastic polymer makers include multiple oil companies. Near the top of the list of 100 are Dow (8), Saudi Aramco (18), Exxon Mobil (19), Chevron Corporation (25), Formosa Plastics Corporation (34), and PetroChina (44)).

<sup>214</sup> See Amy Westervelt, *Exxon Doubles Down on 'Advanced Recycling' Claims that Yield Few Results*, THE GUARDIAN (May 11, 2022, 5:00 AM), <https://www.theguardian.com/environment/2022/may/11/exxon-advanced-recycling-plastic-pollution-investigation> [<https://perma.cc/66FK-9KX5>].

<sup>215</sup> Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENV'T L. REV. 1, 10–11 (2007) (explaining that the industry worked to discredit the science indicating the causation of ozone depletion).

As Professor Shannon Roesler has explored, courts have difficulty assessing the truth or falsity of corporate speech about science.<sup>216</sup> In *Evaluating Corporate Speech About Science*, Prof. Roesler emphasizes the role that antifraud and consumer protection law can play in policing misleading speech about science, using the experience of investigations of ExxonMobil and their knowledge regarding the threat of climate change from greenhouse gas emissions as one example.<sup>217</sup> As Professor Roesler emphasizes, it is important to take account of how people actually understand and process risk.<sup>218</sup> Generally, people are not very good at assessing risk.<sup>219</sup> Prof. Roesler draws on the growing literature in behavioral economics and psychology, as well as the known biases people have to determine when a risk is actually relevant to them and should drive behavior.<sup>220</sup> Plastic is one of those items that generally people assume to be innocuous, and therefore their treatment of it does not capture its potential dangers either immediate or as it aggregates in the environment.

Corporations, despite fighting successfully to secure their first amendment rights, also work hard to obscure their connection to lobbying for particular legislative positions. There are a small number of companies that are responsible for plastic polymer production. This small group has an outsized influence on policymaking. For example, the American Chemistry Council is active in lobbying against any regulation of plastic which would reduce the opportunity to increase the volume of plastic produced in the future.<sup>221</sup> Addressing the problem at this source is far more efficient than downstream regulation and is precisely why the industry is lobbying so hard to prevent bans or restrictions.<sup>222</sup>

#### IV. DISCERNING THE FUTURE OF PLASTIC REGULATION

Plastic is now a frequent target of regulation. Regulation is often forged in response to a perceived or real crisis. This sometimes makes the resulting legislation less effective and economically rational than development of well-considered legislation that objectively analyzes architecture and tradeoffs. As Professors Gary Lucas and Slavisa Tasic describe, “salient events can create an intense demand for

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<sup>216</sup> See generally Roesler, *supra* note 103 (proposing framework for courts to use to a context-specific evaluation for the threshold question of whether speech about science is misleading).

<sup>217</sup> *Id.* at 448–49.

<sup>218</sup> *Id.* at 493.

<sup>219</sup> *Id.* at 494.

<sup>220</sup> *Id.* at 494–95.

<sup>221</sup> John Geddie, Valerie Volcovici & Joe Brock, *Insight: U.N. Pact May Restrict Plastic Production. Big Oil Aims to Stop It.*, REUTERS (Feb. 18, 2022, 4:22 AM), <https://www.reuters.com/business/sustainable-business/un-pact-may-restrict-plastic-production-big-oil-aims-stop-it-2022-02-18/> [<https://perma.cc/AJL6-7LR5>].

<sup>222</sup> See RODGERS & BURLSON, *supra* note 16, at 398, 404 (noting that stopping pollution at its source is effective and industry will lobby against this approach).

legislation that precludes careful consideration of regulatory costs.”<sup>223</sup> They explain that the shortcomings could lead to the unraveling of interventions.<sup>224</sup> Bans have now been in place for more than a decade; while some were clearly the result of campaigns that drew on emotional responses, the current state of knowledge now illustrates that the risk of harm from plastic has been underestimated and the regulatory responses far too weak. Prof. Tony Arnold describes how complex systems can form an organized chaos that befuddles human cognitive capacity, and prevents complete integration.<sup>225</sup> Prof. Arnold goes on to describe the current generation of environmental architecture instead as “integrationist,” referring to a process that seeks to link multiple aspects of a system together.<sup>226</sup> Plastic bans can play an important linking and gap-filling role; bans can also direct a global system toward addressing the cumulative harm from unfettered plastic use. During this most active period in lawmaking to address plastic pollution, the dialogue on bans needs to be robust to bring focus on plastic avoidance and reduction.

#### A. System Change Prompted by Bans

Internationally, many countries have already targeted some plastics with bans. This includes many major economies such as the E.U., which has adopted a goal to encourage a circular economy with recycling by 2030.<sup>227</sup> Australia has adopted a ban on plastic bags, and India and China have pursued single-use plastic bans. But possibly the most consequential ban for moving toward a sustainable plastic approach was China’s decision in 2017 to ban the import of plastic waste, effective in 2018. China’s decision to ban import of plastic waste triggered immediate practical issues and resulted in a broad system change to international plastic waste disposal.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is a multilateral agreement governing exports and imports of primarily hazardous waste for recovery and disposal.<sup>228</sup> The purpose of the Convention was to address the widespread and unethical practice of exporting hazardous waste from industrialized to developing nations.<sup>229</sup> Beginning in 1988 the international agreement sought to promote environmentally sound management of

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<sup>223</sup> Gary M. Lucas, Jr. & Slavisa Tasic, *Behavioral Public Choice and the Law*, 118 W. VA. L. REV. 199, 240 (2015) (explaining various shortcomings of reactive legislation adopted in response to a perceived emergency).

<sup>224</sup> *Id.*

<sup>225</sup> Arnold, *supra* note 113, at 795.

<sup>226</sup> *Id.*

<sup>227</sup> Resolution on European Strategy for Plastics in a Circular Economy of 13 September 2018, EUR. PARL. DOC. 2018/2035(INI).

<sup>228</sup> Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1673 U.N.T.S. 57 (March 22, 1989).

<sup>229</sup> See Sabaa A. Khan, *Clearly Hazardous, Obscurely Regulated: Lessons from the Basel Convention on Waste Trade*, 114 AJIL UNBOUND 200, 201 (2020).

exported and imported waste—especially in developing countries. As of 2023, there are 191 parties to the convention, and the U.S. is a signatory but not yet a party.<sup>230</sup>

In May 2019, parties to the Basel Convention adopted a narrow window of controls over transboundary trade in plastic waste.<sup>231</sup> The new rules came into effect on January 1, 2021.<sup>232</sup> China’s decision in 2017 (effective 2018) to block import of certain wastes was part of the impetus for change.<sup>233</sup> In fact, in the months after China’s ban, port seizures in various South Asian nations showed that huge amounts of hazardous waste falsely labelled as plastic recyclables had been diverted to these destinations from Australia, Canada, the United States, and the European Union.<sup>234</sup>

The mechanism of the Basel Convention is to ensure the Prior Informed Consent (“PIC”) of countries that trade and allow import of waste.<sup>235</sup> Prior to the 2019 amendments, “solid plastic waste” was listed among wastes presumed to be non-hazardous, and were excluded from the scope of the treaty.<sup>236</sup> Plastic waste after the 2019 amendments now moves from generally unregulated and freely traded to three categories, two which require the prior informed consent and notice from the importing country before it can leave the exporting country.<sup>237</sup>

The third category of waste, which allows trade not subject to the Basel Convention controls (i.e., PIC) generally includes plastic scrap that is pre-sorted, clean, uncontaminated, and destined for recycling in an environmentally sound manner.<sup>238</sup> Practically speaking this means single polymer plastics, which are capable of being recycled.<sup>239</sup>

As previously mentioned, the U.S. is not a party to the Basel Convention, but U.S. exports and imports of non-hazardous plastic scrap and waste are subject to applicable laws and regulations in the country or countries that control the waste, as well as any applicable international agreement, such as the Basel Convention.<sup>240</sup> Thus, the U.S. must comply with these requirements since many countries will apply Basel Convention requirements to transboundary movements of this material.

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<sup>230</sup> Tseming Yang & C. Scott Fulton, *The Case for U.S. Ratification of the Basel Convention on Hazardous Wastes* 25 N.Y.U. ENV’T L. J. 52, 57 (2017) (urging ratification and noting that despite being a signatory the U.S. is not yet a party); *Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal*, BASEL CONVENTION, <https://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/4499/Default.aspx> [<https://perma.cc/647Y-NPYY>] (last visited Aug. 17, 2023).

<sup>231</sup> Linda Del Savio, *The Role of Trade in Governing Plastic Pollution*, 27 OCEAN & COASTAL L. J. 1, 19 (2022).

<sup>232</sup> *Id.*

<sup>233</sup> *Id.* (discussing the PRC National Sword Policy and industry opposition to blocking plastic scrap waste imports).

<sup>234</sup> Khan, *supra* note 229, at 202.

<sup>235</sup> *Id.* at 201.

<sup>236</sup> *Id.* at 201–02.

<sup>237</sup> *Id.*

<sup>238</sup> *Id.* at 203.

<sup>239</sup> *Id.* at 202.

<sup>240</sup> Yang & Fulton, *supra* note 230.

Author Sabaa Ahmad Khan stated succinctly that “[i]n essence, the Basel plastic waste amendments will force all countries involved in the global plastic waste trade—Basel parties and non-parties alike—to reconceptualize their plastic waste management infrastructures.”<sup>241</sup>

Obviously, China’s ban is relevant because the U.S. generates a significant amount of plastic waste—the largest volume of any nation.<sup>242</sup> Much of that waste is not designed to be recycled. Therefore, the overall thrust of these changes will be to discourage the production of hard-to-recycle plastics and to prevent industrialized nations from dumping trash in developing nations—where this trash can pollute the local environment and eventually the oceans. Indeed, news outlets have reported that officials in Malaysia have turned away more than 150 containers of generally unlicensed and unrecyclable garbage—illegal plastic waste, back to their countries of origin since 2019.<sup>243</sup>

The 2019 Basel Amendments are a welcome start to addressing the issue of plastic waste. The adoption of a “hazardous waste” label for certain plastics clearly demonstrates the recognition among nations of the harm from plastic, particularly in importing countries. The thrust of these Basel Amendments, spurred by China’s import ban, will be to discourage the production of hard-to-recycle plastics, that eventually can pollute the environment. But this also demonstrates the important synergistic role that bans can play in pushing development of an international system to address the plastic crisis.

### *B. Bans vs. Waste Management Focus*

The plastic that enters our environment and causes human and wildlife damage is often discarded waste. Thus, one of the reasons why efforts to control plastic pollution are failing is that local management of waste generally is inadequate. The reality is that we continually have more plastic packaging and products in use, increasing the burden on landfills and local depository sites. An individual’s capacity to keep track of every piece of plastic that they encounter is limited, even with the best of intentions. Littering itself is one of the major challenges as stormwaters bring plastic littered waste into streams and ultimately out to our oceans.<sup>244</sup> Therefore, banning unnecessary plastic avoids engaging waste management systems altogether.

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<sup>241</sup> Khan, *supra* note 229, at 203.

<sup>242</sup> Kara Lavender Law, Natalie Starr, Theodore R. Siegler, Jenna R. Jambeck, Nicholas J. Mallos & George H. Leonard, *The United States’ Contribution of Plastic Waste to Land and Ocean*, 6 SCI ADVANCES, no. 44, Oct. 2020, at 1 (stating the U.S. is also the second largest exporter of plastic scrap).

<sup>243</sup> Associated Press, *Malaysia Sends Back Trash, Says It Won’t Be the ‘Rubbish Dump of the World,’* LOS ANGELES TIMES (Jan. 19, 2020 10:34 PM), <https://www.latimes.com/environment/story/2020-01-19/malaysia-sends-back-trash-says-it-wont-be-the-rubbish-dump-of-the-world> [<https://perma.cc/J4XK-J8X4>].

<sup>244</sup> See Salcido, *supra* note 82, at 316 (noting that EPA’s trash free waters program focuses on the problem of stormwater and litter).



Although the U.S. is one of the greatest users of plastics, a lot of waste plastic that ends up in the oceans is coming from large cities in Asia<sup>245</sup> and around the world in developing countries where waste management is insufficient.<sup>246</sup> Indonesia recently had to call in its army to scoop plastic out of the river in the city of Bandung.<sup>247</sup> Regulation in those settings is much less likely to effectively capture plastic waste. The booming international waste business led to the 2019 amendment to the Basel Convention on Hazardous Waste, so that developing nations did not have to be the repository for millions of tons of unrecyclable plastic waste product.

The scope of the plastic pollution problem requires creating a system that is integrationist. The regulatory system in the U.S. cannot be completely divorced from the global economy and the regulation occurring in other nations. Instead of pushing the burden onto the least capable of addressing it, the U.S. needs to cut off the production and use of unnecessary plastic from the outset. While some of this is happening city by city and state by state, more can be done.

While the focus on plastic pollution as a waste problem would direct efforts on shoring up basic sewage systems, other scholars advocate approaches to track plastic throughout its entire lifecycle, much like hazardous waste.<sup>248</sup> This will certainly make inroads into applications of plastic integrated into products that have longer lifespans but does not make practical sense for single-use plastic products. Extended producer liability (“EPL”) frameworks, where manufacturers of products are engaged directly in plastic pollution regulation, are gaining in prominence as the policy prescription for plastic that is deemed necessary and unavoidable.<sup>249</sup> EPL could demand producers of plastic products fund regulatory schemes that track and monitor, and ultimately recover and sustainably manage plastic they sell into the economy.<sup>250</sup>

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<sup>245</sup> See Laurent C.M. Lebreton, Joost van der Zwet, Jan-Willem Damsteeg, Boyan Slat, Anthony Andrady & Julia Reisser, *River Plastic Emissions to the World’s Oceans*, 8 NATURE COMM’NS., no. 1, 2017, at 3–4 (noting that episodes of heavy rainfall results in the plastic release from rivers to oceans, with the top contributors of plastic pollution in China, India, and Indonesia).

<sup>246</sup> See Whiting, *supra* note 83; Law et al., *supra* note 242.

<sup>247</sup> Whiting, *supra* note 83.

<sup>248</sup> See generally RODGERS & BURLSON, *supra* note 16, at 395–96 (examining approaching plastic waste as hazardous waste).

<sup>249</sup> See Morales-Caselles et al., *supra* note 27, at 490 (advocating regulatory bans on avoidable single-use plastic take out items and noting that extended producer liability should be implemented for other unavoidable uses of plastic to tackle marine debris).

<sup>250</sup> California’s SB 54 takes a step in this direction by requiring that all producers of covered plastic materials join a producer responsibility organization (PRO) or they will be prohibited from selling or distributing covered materials in California. Thereafter, the organizations will have to contribute fees and fund the implementation of source reduction and recovery. CAL. PUB. RES. CODE. §§ 41821.5, 42040, 42064 (2022).

C. *Bans vs. Regulation and Recycling in the U.S. Legislature*

In fact, many of the efforts by legislatures and municipalities to date are better described as regulations rather than true bans. Using the term ban is useful for the goal of changing norms around single-use plastic products. Items that are merely regulated seem far less objectionable and perhaps safer compared to things that have been banned, as regulation is often invisible to the end user and consumer. Moreover, even advocates that support plastic bans as a tool also criticize the utility of those efforts unless they are coupled with strong consumer support.<sup>251</sup>

The two visions of the future, where plastic is significantly reduced and contained or continues its accumulation and increasingly harmful impacts, are playing out in U.S. legislative arenas. The philosophy of whether the burden is on governments and individual consumers or the industries profiting from plastic production and use is also front and center in the framework of legislative efforts to address plastic pollution. In terms of whether bans are politically feasible, it makes all the difference whether the problem is framed as one of irresponsible consumer behavior or a defective product that should not be flooding the market.

Recycling, long a promised salve to the issue of solid waste disposal, has arisen as the choice architecture for continued plastic use. Recycling has never been economical or even feasible under existing formulations of plastic products.<sup>252</sup> The E.U. is pursuing a goal of achieving a circular economy and have emphasized in other international treaties creating forums that work to regulate plastic at the global scale. Recycling has long been a proposed mitigation measure to address the accumulation of excessive amounts of plastic, but the facts have always dictated it as a fallacy. Every single piece of plastic ever created is still in existence.<sup>253</sup> More than fifty percent of single-use plastics end up in our oceans.<sup>254</sup> Experts estimate that less than ten percent of plastic made has ever been recycled.<sup>255</sup> The plastic industry has pushed hard for the U.S. to support enhanced recycling efforts. The industry supports laws that would enhance public funding of improved waste management and recycling efforts.<sup>256</sup> The Realizing the Economic Opportunities and Value of Expanding Recycling (“RECOVER”) Act allocates federal monies to states and

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<sup>251</sup> Dere, *supra* note 126, at 82.

<sup>252</sup> See Tim Dickinson, *How Big Oil and Big Soda Kept a Global Environmental Calamity a Secret for Decades*, ROLLING STONE (Mar. 3, 2020, 6:00 AM), <https://www.rollingstone.com/culture/culture-features/plastic-problem-recycling-myth-big-oil-950957/> [<https://perma.cc/RXG2-D8UW>].

<sup>253</sup> Madison Park, *How Much Are We Trashing Our Oceans?*, CNN (Feb. 12, 2015, 2:29 PM), <http://www.cnn.com/2015/02/12/world/ocean-trash-pollution/> [<https://perma.cc/MC7M-97WN>].

<sup>254</sup> Dere, *supra* note 126, at 83 (discussing India’s ban on single-use plastic products).

<sup>255</sup> Geyer et al., *supra* note 14.

<sup>256</sup> See *PLASTICS Applauds Bipartisan RECOVER Act to Improve Recycling Infrastructure*, WASTE ADVANTAGE MAG. (Apr. 6, 2021), <https://wasteadvantagemag.com/plastics-applauds-bipartisan-recover-act-to-improve-recycling-infrastructure/> [<https://perma.cc/Q9U2-8A9S>].

municipalities to improve recycling infrastructure and programs.<sup>257</sup> It pushes public-private partnerships and is backed by the Plastics Industry Association (“PLASTICS”).<sup>258</sup> Thus, the RECOVER Act perpetuates the myth that recycling plastic can avoid the harms from plastic pollution.<sup>259</sup>

Alternatively, the Break Free from Plastic Pollution Act of 2020 introduced in the House of Representatives proposed aggressive steps to address plastic pollution.<sup>260</sup> First, the Act sought to create liability on certain plastic producers to collect and manage their products, a take back program where producers would be fiscally responsible for collecting, managing, and recycling or composting products after consumer use. The Act also established that a certain amount of plastic must be reused and recycled. Finally, the act did employ a ban on certain products—requiring that certain single use products like utensils be phased out starting on January 1, 2022.<sup>261</sup> The bill would also put a temporary moratorium on permits for plastic manufacturing facilities until regulations to address pollution are updated.<sup>262</sup> Exports of plastic waste to other countries would also be limited by this bill.<sup>263</sup> In 2021, Sen. Jeff Markley and Rep. Alan Lowenthal introduced another version of the Break Free from Plastic Pollution Act.<sup>264</sup> This version has more focus on extended producer responsibility, or “EPR,” which matches the EPL concept discussed previously.

In all, the Break Free from Plastic Pollution Act proposed more aggressive action than the plastic industry is willing to tolerate. Its lobbying efforts against the Act were significant. The PLASTICS chief economist was quoted as saying that the Act “poses serious danger to America’s economy, particularly the manufacturing sector . . . . It puts the over \$7.0 billion capital expenditure spending in plastics material and resin manufacturing in serious jeopardy.”<sup>265</sup> Analogous to arguments made in 2008 of banks that were “too big to fail,” the industry is emphasizing the interconnectedness of plastics and the economy to stave off regulatory efforts that phase-out unnecessary plastic such as single-use items.<sup>266</sup>

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<sup>257</sup> RECOVER Act, H.R. 5115, 116th Cong. § 3(a) (2019).

<sup>258</sup> Deanne Toto, *US House Committee on Energy and Commerce to Consider RECOVER Act*, RECYCLING TODAY (Nov. 15, 2019), <https://www.recyclingtoday.com/article/recover-act-goes-before-house-committee/> [<https://perma.cc/BP97-KMFT>].

<sup>259</sup> ALICE DELEMARE TANGPUORI, GEORGE HARDING-ROLLS, NUSA URBANCIC & XIMENA PURITA BANEGAS ZALLIO, CHANGING MKTS. FOUND., TALKING TRASH: THE CORPORATE PLAYBOOK OF FALSE SOLUTIONS TO THE PLASTIC CRISIS 11 (2020), [https://talking-trash.com/wp-content/uploads/2020/09/TalkingTrash\\_FullReport.pdf](https://talking-trash.com/wp-content/uploads/2020/09/TalkingTrash_FullReport.pdf) [<https://perma.cc/8NYS-LNJA>].

<sup>260</sup> *See* Break Free from Plastic Pollution Act of 2020, H.R. 5845, 116th Cong. (2020).

<sup>261</sup> *See id.*

<sup>262</sup> *See id.*

<sup>263</sup> *See id.* § 12306.

<sup>264</sup> *See* Break Free from Plastic Pollution Act of 2021, S. 984, 117th Cong. (2021).

<sup>265</sup> *PLASTICS Responds to Break Free Act*, PLASTICS INDUS. ASS’N (Mar. 25, 2021), <https://www.plasticsindustry.org/newsroom/plastics-responds-break-free-act/> [<https://perma.cc/5335-UJ6M>].

<sup>266</sup> *See* DELEMARE TANGPUORI ET AL., *supra* note 259, at 46.

The Break Free Act also signals the relationship that is currently in place between people and plastic usage is unhealthy. By emphasizing that we need to “break-free” the legislative sponsors indicate that currently our liberty interests are impacted. In fact, consumers have very limited options to avoid plastic usage. Some scholars posit that this complex relationship with plastic leads to anxiety and ultimately a false adoption of “eco-consumerism” where individuals seek companies that claim to sell products with reduced plastic impacts.<sup>267</sup>

#### *D. Course and Fine Grain Plastic Regulation*

Regardless of whether we are able to tackle unnecessary plastic with appropriate bans and phase-outs, society has already identified some indispensable uses for plastic. Plastic will very likely continue to be used for critical products for which we have no replacements such as medical devices.<sup>268</sup> In these instances, we can rely on the precedent created by restricting particular uses of materials while allowing other uses society has deemed invaluable. Taking a course and a fine-grained approach, using bans on single-use plastic screens out one particular plastic use with identifiable harms, and leaves open the opportunity to develop more fine-tuned regulation to address plastic use in other specific applications.

This combined course and fine-grained regulatory approach is ubiquitous in our complex economy. For example, despite the inherently harmful nature of nuclear materials, many countries continue to use nuclear energy based on its socially beneficial purpose, but highly regulate that industry.<sup>269</sup> Numerous approaches for nuclear safeguards attempt to mitigate the potential for proliferation.<sup>270</sup> This demonstrates how some materials that have an inherently harmful nature lead to extreme restrictions on use and accessibility. We also restrict certain consumer products, such as alcohol and tobacco, to individuals seen as more responsible with their use.

Although plastic is not inherently toxic the way that nuclear materials are, over the decades of use, the vast accumulation of plastics has become toxic to human

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<sup>267</sup> See Smith & Brisman, *supra* note 97, at 297–301.

<sup>268</sup> See, e.g., Nøklebye et al., *supra* note 95, at 222 (the bans on certain single-use plastics in India were based on an expert report which identified certain medical single-use plastics such as blood bags and plastic syringes as so high in utility that they were not considered problematic so that they were not included in the ban. However, notably much medical waste is regulated by other guidelines).

<sup>269</sup> See Sophie Grape, Staffan Jacobsson Svård, Carl Hellesen, Peter Jansson & Matilda Åberg Lindell, *New Perspectives on Nuclear Power—Generation IV Nuclear Energy Systems to Strengthen Nuclear Non-Proliferation and Support Nuclear Disarmament*, 73 ENERGY POL’Y 815, 816 (2014); *Global Nuclear Safety and Security Network (GNSSN)*, IAEA, <https://www.iaea.org/services/networks/global-nuclear-safety-and-security-network> [<https://perma.cc/X7TN-ZHLE>] (last visited Aug. 17, 2023).

<sup>270</sup> See Grape et al., *supra* note 269, at 816; see also Treaty on the Non-Proliferation of Nuclear Weapons, art. 1, *opened for signature* July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161 (attempting to prevent the spread of nuclear weapons and technology).

health and the environment. Restriction on widespread use is a practical response to achieve protection from these particular harms. When items have inherently dangerous properties but high societal value the framework for use addresses pathways for use and areas of restricted use. This is the best path forward for those application of plastics in areas where normatively the harm does not exceed the value to society. Extended producer liability to capture plastic waste from these products would be appropriate.

#### CONCLUSION

There is widespread agreement that plastic is causing unacceptable harm to human health and the environment. Banning unnecessary plastic would target a major source of the harm and would work synergistically with other regulatory frameworks that seek to continue plastic use in essential applications. Bans emphasize source reduction and alternatives. But without concerted effort and advocacy, law and policymakers are likely to adopt much weaker, inadequate controls that will fail to tackle this growing problem.

The current landscape of plastic bans at local, state, and national levels are a start toward addressing the legal gaps that allow plastic to pollute our rivers, lakes, and oceans. The form of these bans and their emergence from a variety of policymaking arenas exhibits the possibility for a multi-pronged approach to whittling away at the goliath problem posed by plastics. They also provide proof of concept that bans spur innovation and are more widely accepted by consumers than the plastic industry contends. To achieve more widespread bans advocated at the local level in the U.S. it may be necessary for Congress to intervene with legislation containing the elements present in the Break Free From Plastic Pollution Act of 2020.

Finally, international cooperation will be crucial to implementing the full range of actions needed to address the plastic pollution crisis. Even so, banning single-use plastic in the U.S. is critical because the U.S. is a major consumer of single-use plastic products. Experience with bans in environmental law illustrates that major environmental problems can be successfully addressed when the entire suite of regulatory options is employed. Inaction is not an option, but unless we wish to blanket the planet in a layer of synthetic garbage, production of plastic must be dramatically curtailed. Banning plastic for non-essential uses is the solution.