ALL SINGLE-USE PLASTICS ARE NOT CREATED EQUAL

A Policy Framework for Reducing the Environmental Impact of Single-Use Plastics

Essential Plastics Coalition

Protecting High Value Plastics

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SUMMARY

- Many single-use plastics are contributing to ocean pollution and threatening marine life.
- Recognizing that not all single-use plastics are of equal value to society but rather exist in a hierarchy of value, policymakers should focus their environmental restrictions on low-value, single-use plastic consumption.
- Recognizing that some single-use plastics have important benefits for human health and wellbeing, policymakers should exempt high-value plastics necessary for many healthcare applications, perishable food, and purified water from restrictions.
- To limit the environmental impact from vital high-value plastics, policymakers and environmental groups should emphasize recycling.

INTRODUCTION

When marine biologist Christine Figgener filmed her colleagues extracting a plastic straw from the nose of a giant sea turtle off the coast of Costa Rica in 2015, she had no idea that she was poised to change the environmental movement forever. It is almost impossible to watch this viral video without having a strong emotional reaction to plastic's environmental impact.[1]

Roughly 80 million views later,[2] the general public increasingly recognizes that single-use plastics have significant environmental consequences. The plastic straw—a mostly unnecessary tool that could easily be substituted with paper—is a symbol of the broader problem of low-value plastic overuse that is contributing to ocean pollution and threatening marine life.

Low-value, single-use plastic pollution may represent a market failure because the full environmental impact of low-value plastic overuse is not reflected in its price. There is a growing recognition among policymakers and the general public that the consumption of single-use plastics must be curtailed to reflect these environmental externalities.

The vast majority of plastic ocean pollution comes from countries in Asia.[3] But since the U.S. exports much of its used plastic to these nations,[4] American policymakers are right to work toward solutions. State and local jurisdictions across the U.S. are considering new restrictions on plastic use to try to alleviate its environmental impact, while countries across the globe have implemented their own restrictions, and the United Nations has declared "war" on ocean plastic.[5]

Political demands to fix the plastic problem cut across partisan lines. According to a recent survey,[6] 65% of Americans are "very concerned or extremely concerned" about plastic waste in the ocean. Federal Republicans' environmental policy framework,[7] released in 2020, lists plastic conservation as the main tenet.

Yet these demands generally fail to recognize that all single-use plastics are not created equal. By treating all single-use plastics as having the same value, policymakers threaten human lives that depend on high-value plastics. Policymakers and environmental groups must capitalize on public opinion by taking a rational approach that addresses single-use plastics according to a hierarchy of value. Such a hierarchy would focus on initiatives to reduce the lowest value single-use plastics first while exempting high-value plastics necessary for human life.

Focusing policy actions on low-hanging, low-value plastics such as plastic straws, plastic eating utensils, and superfluous packaging can generate widespread public support without the potential backlash and major consequences that would occur from restricting high-value plastics essential for healthcare, perishable food, and water.

To deal with the remaining plastic waste from high-value plastics, policymakers, and environmental groups should focus on effective recycling systems, which have enormous

potential to reduce plastics' environmental impact. With less low-value plastic waste clogging up recycling systems, recycling could become more efficient and profitable as prices for plastic recyclables are bid up.

Public and private initiatives to reduce low-value, single-use plastics combined with strong exemptions for high-value plastics can alleviate ocean pollution without threatening human lives.

Figure 1: Plastic Straw Extracted from Sea Turtle's Nose in Viral Video

Source: YouTube screenshot; "Sea Turtle Biologist"

THE PLASTICS THREAT

Midway Atoll is a remote island in the middle of the Pacific Ocean thousands of miles away from civilization. Its 40 human residents are dwarfed by the millions of albatross inhabitants. Cut open the stomachs of any albatross on the island and you will find a cornucopia of plastic waste.

Roughly 20 tons of plastic waste washes up on Midway each year,[8] one-quarter of which ends up in the stomachs of albatross chicks. According to a recent study,[9] 90% of marine birds have eaten plastic – about 20 times as many as in 1960. The birds mistake the plastic for food, feeding it to their chicks, causing malnutrition, death, and species endangerment. Roughly one-third of the albatross chicks on Midway die.[10]

Each year, around ten million tons of plastic enter the oceans.[11] One controversial analysis claims that, if action is not taken, there could be more plastic, by weight, than fish by 2050.

Plastic bags are routinely mistaken by sea life for jellyfish. In Thailand, a pilot whale recently died with 80 plastic bags in its stomach.[12] Additionally, older plastic is broken down by the sun, salt, and waves of the ocean into microplastic beads, which fish and birds commonly mistake for food.

Reef fish are among the species most likely to consume plastic waste. This is an issue because these fish are eaten not only by local fishermen but also by larger predators higher up the food chain such as tuna, which absorb the plastic pollution in their tissue. This can lead to additional human consumption of fish tainted by plastic, which could potentially cause long-term health consequences, according to research in *Scientific Reports* and other leading journals.[13]

Figure 2: Plastic Waste in Bali, Indonesia

Source: Maxim Blinkov, Shutterstock

LOW-VALUE, SINGLE-USE PLASTIC IS A MAJOR CULPRIT

Plastic production and consumption have increased exponentially over the last 70 years. About 300 million tons of plastic is produced globally each year,[14] half of which is for disposable items that are discarded after a single-use.

Each year, ordinary Americans and Europeans use around 100 kilograms of plastic per capita, mostly consisting of packaging. While Asians use only about 20 kilograms per person, their use is expected to rise along with their economic growth.

With the exception of standard plastic bottles, most plastic waste — even plastic put in recycling bins — ends up in landfills. A recent Greenpeace report that examined the United States' 367 recycling facilities found that — aside from plastic bottles — most other types of plastic is usually landfilled or incinerated.

Because of food and liquid contamination, improper consumer disposal, and the lack of a profitable recycling market for most plastics other than bottles,[15] most plastics are not recycled. According to the Environmental Protection Agency, only around 10 percent of the plastic generated in the U.S. is recycled on an annual basis.[16]

In developed countries, most plastic goes to landfills, but in some developing countries, it gets littered or tossed into open dumps, where it makes its way into rivers and then into oceans. Ten rivers, which are all found in Asia or Africa, contribute more than 90 percent of ocean plastics from rivers.[17]

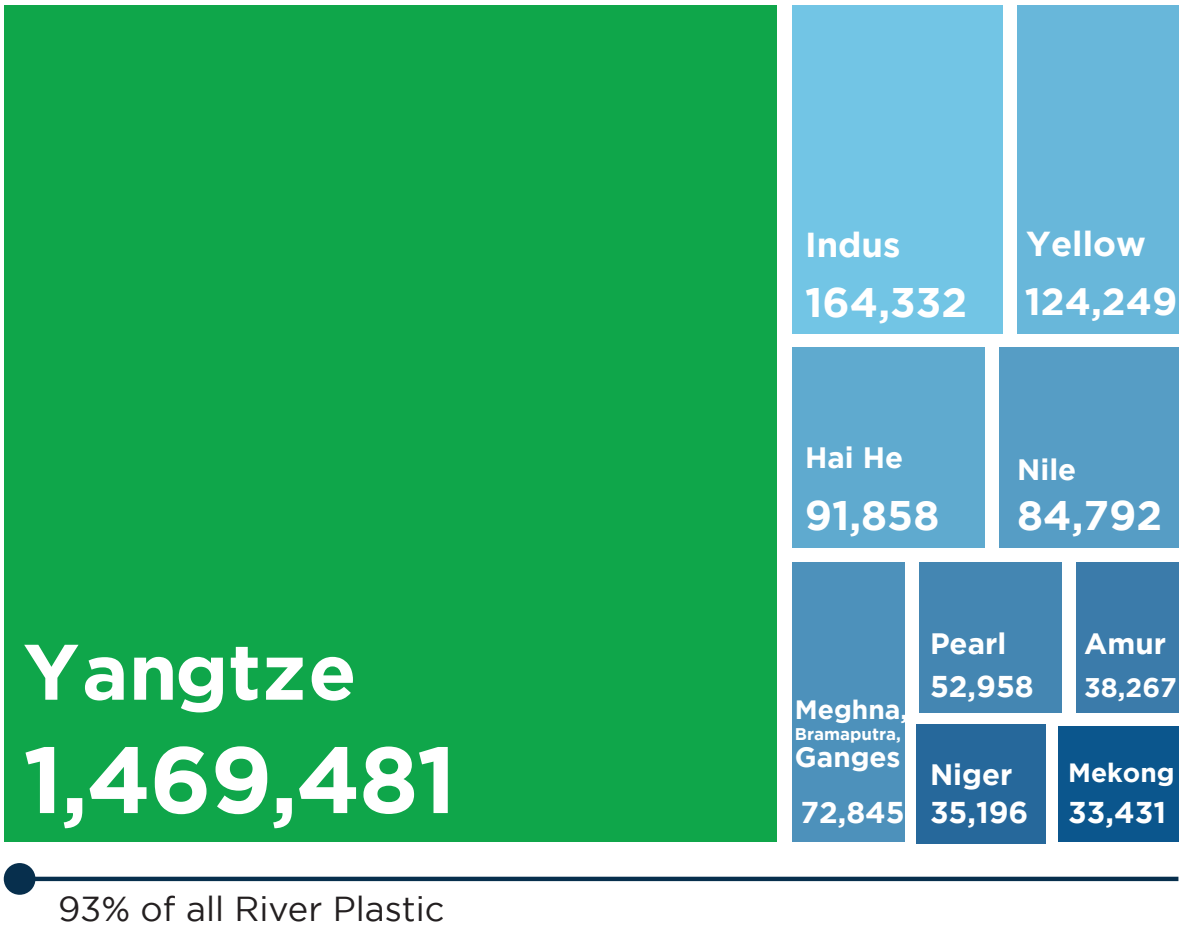
The U.S. generates 34.5 million tons of plastic each year, enough to fill a professional football stadium 1,000 times. While plastic bottles remain recyclable, an investigation by *The Guardian* finds that almost no domestic recyclers will accept mixed plastics such as clamshell-style food packaging,[18] take-out containers, and drink cups.

As a result, the U.S. exports about one-third of its plastic recycling,[19] mostly to developing countries that mismanage plastic waste.[20] In 2018, approximately 157,000 large 20-foot shipping containers (429 per day) of U.S. plastic waste were exported to developing countries that are the primary culprits of plastic pollution in the ocean,[21] largely due to the fact that they are overburdened with plastic waste.

For instance, Malaysia, one of the biggest importers of U.S. plastic recycling, mismanages 55 percent of its plastic. Indonesia and Vietnam, two other major importers, improperly dispose of 81 percent and 86 percent, respectively.

Single-use plastics are not necessarily the biggest culprit of plastic pollution in the ocean. Fishing gear, tire particles,[22] and microplastics from washing synthetic clothes also make up major portions of ocean plastic pollution. Most studies suggest that 80 percent of the plastic comes from land while 20 percent is from fishing sources, yet a recent study published in *Scientific Reports* finds that, when measured by weight, discarded fishing gear accounts for most of the ocean's plastic waste.[23] Restrictions on fishermen's plastic should be part of any long-term solution to the plastic pollution problem.

Figure 3: Tons of Annual Plastic Flowing Into Oceans by River



Source: "Export of Plastic Debris by Rivers into the Sea," by Christian Schmidt et al, in Environmental Science & Technology, Vol. 51, No. 21; November 7, 2017

A HIERARCHY OF SINGLE-USE PLASTICS

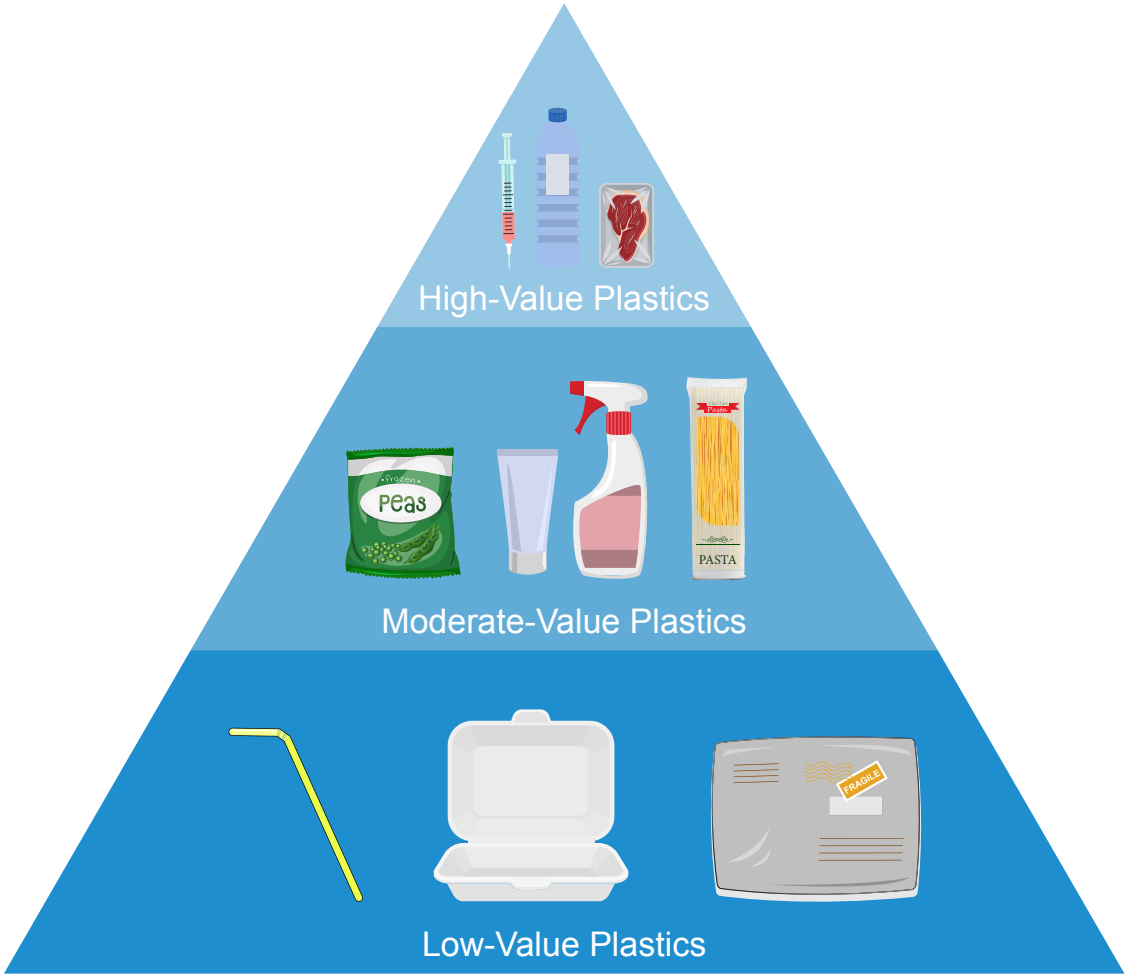
Policymakers and environmentalists make a major mistake in their efforts to address the plastics threat by treating all single-use plastics as equal. In reality, they exist according to a hierarchy of value that should inform plastic restrictions. The single-use plastic hierarchy can generally be thought of as follows:

- **Low-value plastics** — Use of these plastics could be reduced or substituted for an environmentally friendly alternative with a small price impact for consumers and no repercussions on human health. Examples include: plastic straws, internet-sale packaging, and take-out/delivery containers (especially unrecyclable black plastic). Policymakers should target these single-use plastics for environmental initiatives.

- **Moderate-value plastics** — Use of these plastics could not be restricted or substituted without a noticeable price or convenience impact on consumers, though likely no impact on human health. Examples include: plastics used in *non-perishable* food packaging, consumer goods, and housewares. Policymakers, environmental groups, and concerned citizens can have good-faith disagreements over the best way to limit the use of these plastics. However, government restrictions would generate consumer backlash that may doom legislative efforts to address low-value plastics.

- **High-value plastics** — Use of these plastics cannot be restricted without significant risks to human life. Examples include: plastics used in healthcare, *perishable* food packaging, and bottled water. Policymakers should universally exempt these plastics from any forthcoming restrictions.

Figure 4: A Hierarchy of Single-Use Plastic Value



LOW-VALUE PLASTICS

Some single-use plastics offer little-to-no value for consumers. Order a pair of socks, a blanket, or stick of deodorant and it will show up in either a plastic-padded envelope or a cardboard box stuffed with plastic air pillows. With internet-sales direct to consumers increasing, its environmental impact has been largely overlooked. The gig economy and increased convenience of online shopping and online ordering have led to an explosion of unnecessary plastic use which wouldn't occur if low-value plastics were priced according to their true cost to the environment.

Amazon ships between four and five billion parcels a year across the globe.[24] During just the 36-hour Amazon Prime Day event in 2019, consumers bought over 175 million items.[25] According to a *Washington Post* report,[26] Amazon's plastic packages are clogging up recycling centers because customers are wrongly putting them in recycling bins despite the fact they can't be recycled by

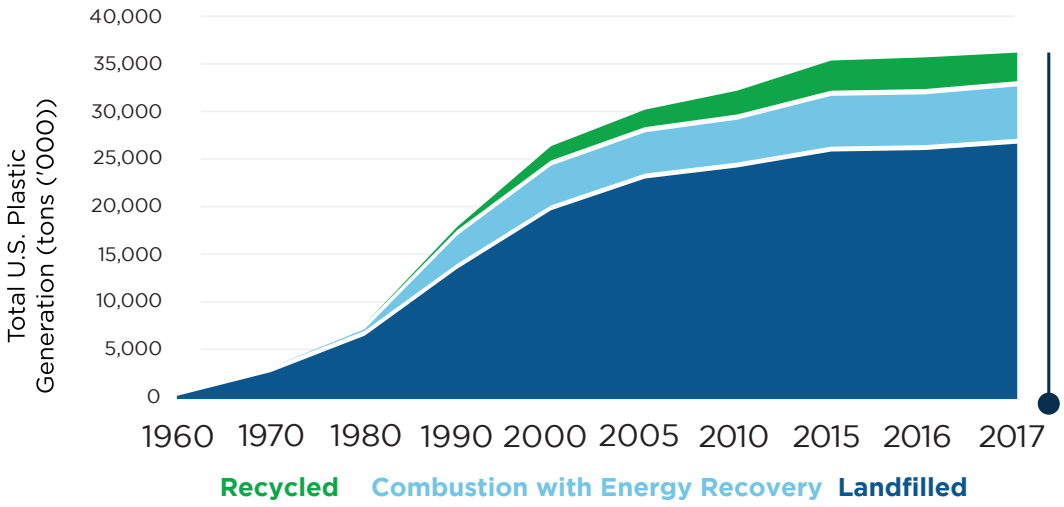
most centers. Thousands of Amazon customers have signed a petition pressuring the online giant to return to a more environmentally friendly recyclable cardboard.[27]

Rising in parallel with Amazon has been the increased number of food deliveries with the convenience of gig economy companies such as DoorDash, Grubhub, and Uber Eats. More than 80 percent of Americans now order out for food at least once every two weeks.[28] Styrofoam and clear plastic clamshells, sushi and burrito trays, sauce and drink cups, plastic cutlery, plastic bags, and (of course) plastic straws accompany most of these orders. Americans toss 64 billion disposable plastic and foam cups.[29] Plastic take-out containers are especially bad for the environment because they are often made of black plastic — think the bottom of a sushi tray or noodle dish — that cannot be recycled.

Much of the low-value, single-use plastic consumption associated with Amazon.com and food deliveries could be reduced or substituted with little consequences for consumers. For instance, plastic bubble packaging for non-breakable and non-damageable shipped packages could be eliminated. Plastic air pillows could often be replaced with newspaper or other paper insulation for all but the most breakable items. Similarly, plastic straws and cutlery for home delivery could be foregone in the overwhelming majority of food orders. Meanwhile, plastic cups and clamshells — especially black plastic containers — could be replaced with more environmentally friendly alternatives.

Consumers may see a small impact on prices of other plastic items when low-value plastics are reduced because less plastic supply could drive up prices for remaining higher value plastic. Nevertheless, policymakers should direct their environmental initiatives on single-use plastics to these types of low-value superfluous uses that could be reduced or easily substituted with little consequences for consumers and human health.

Figure 5: Plastic Waste Management: 1960-2017



Source: U.S. Environmental Protection Agency

MODERATE-VALUE PLASTICS

Plastic is a miracle product that has revolutionized the consumer experience. It is present in nearly all consumer goods, such as non-perishable foods and housewares. Reducing the use of these moderate value plastics would produce harm for consumers by making products lower quality and/or more expensive. However, reducing these moderate-value plastics would probably not impact human health.

There may be room at the margin for initiatives to, for instance, return dried rice and pasta packaging to cardboard instead of the most common plastic. However, small changes in prices to move to more expensive paper packaging may harm consumers on fixed-incomes.

Policymakers risk blowback from consumers if they begin to regulate these moderate-value single-use plastic consumer products. To the extent that policymakers reduce these plastics, they risk diluting the strong public opinion that's needed for legislative action to reduce low-value, single-use plastics.

There can be good-faith disagreements among policymakers, environmentalists, and concerned citizens about how best to reduce consumption of moderate-value plastics. Encouraging manufacturers to shift to more environmentally friendly packaging and working to fix the recycling system so it can once again profitably process mixed plastics may be the best compromise solution.

Policymakers can return to the issue of moderate-value single-use plastics once they've addressed low-value plastics.

HIGH-VALUE PLASTICS

There are narrow instances when single-use plastic is essential for preserving human life. In these cases, restricting plastic poses a clear and direct threat to humans. These high-value plastics are mostly confined to three areas: healthcare, perishable food, and water. Policymakers must ensure that these plastics are exempted from any single-use plastics restrictions.

HEALTHCARE

Plastic, which is lightweight, low cost, durable, transparent, and impermeable, is ideal for medical applications. Today's most innovative medical procedures require the use of plastics.

Restricting single-use plastics used in the medical field threatens countless human lives. The COVID-19 crisis reinforced the need for a nimble and efficient medical supply chain, which can quickly ramp up production of easily scalable single-use plastic medical devices and protective materials.

There is a nearly endless number of single-use plastic products that are vital in healthcare.[30] These include syringes, splints, surgical and examination gloves, catheters, insulin pens, IV bags, inhalers, wipes, and droppers. The COVID-19 crisis demonstrated the essential role of personal protective equipment (PPE) and vast stockpiles of PPE, which is generally made from single-use plastics. There is no substitute for these lifesaving pieces of medical protection – especially during a pandemic.

Plastic offers several unique advantages in healthcare, including sterility and safety. These plastic products are intended for single-use and help prevent the spread of bacteria and disease by eliminating the need to sterilize and reuse devices. Plastic's protective coatings and resistance to shattering means that it can be used to house, transport, and protect against hazardous materials, including medical waste, viruses, and biological material.

The sterility and safety benefits of plastic have prevented countless infections, injuries, and deaths. Consider the impact of disposable syringes, surgical gloves, and saline bags.

- **Syringes** – Disposable plastic syringes are inexpensive enough to only be used once, preventing the potential spread of blood or bacteria-borne diseases such as HIV or hepatitis, which are common among intravenous drug users. Reusable syringes can also introduce bacteria from the skin into the bloodstream even when used by the same person such as a diabetic, risking serious infections. Plastic syringes are also more effective because plastic pistons form a better seal.

- **Surgical gloves** – Disposable plastic surgical and exam gloves have significantly reduced patient infections and have become a necessary part of medical treatments and surgeries. They dramatically reduce the potential that prevalent bacteria on hands will spread from hospital staff to vulnerable patients.

- **Saline bags** – Disposable plastic IV bags allow for closed transfusions. Open transfusions under the glass IV systems were far more dangerous because they allow pathogen entry.[31] Plastic IV bags are one of the most important tools in medicine, allowing doctors to easily and safely administer fluids, medications, dialysis, and chemotherapy.

Restricting the plastic used in medical supplies and protective equipment would increase infections, diseases, and death. Therefore, single-use plastics used for healthcare purposes must be exempted from any restrictions on single-use plastics.

PERISHABLE FOODS

Plastic packaging reduces pervasive food waste, which causes environmental and nutritional problems as it extends the lifespans of fresh foods by forming a lightweight seal to prevent oxidization and spoilage.

The U.S. Department of Agriculture estimates that 30 to 40 percent of the American food supply is wasted.[32] The United Nations claims that one-third of all food produced in the world is wasted.[33] Food waste has increased by 50 percent since 1974.[34] One out of every four calories produced globally for human consumption is lost or wasted.[35] Food waste is one of the biggest environmental and nutrition problems plaguing the planet. As part of its Sustainable Development Goals, the UN seeks to halve food waste by 2030.

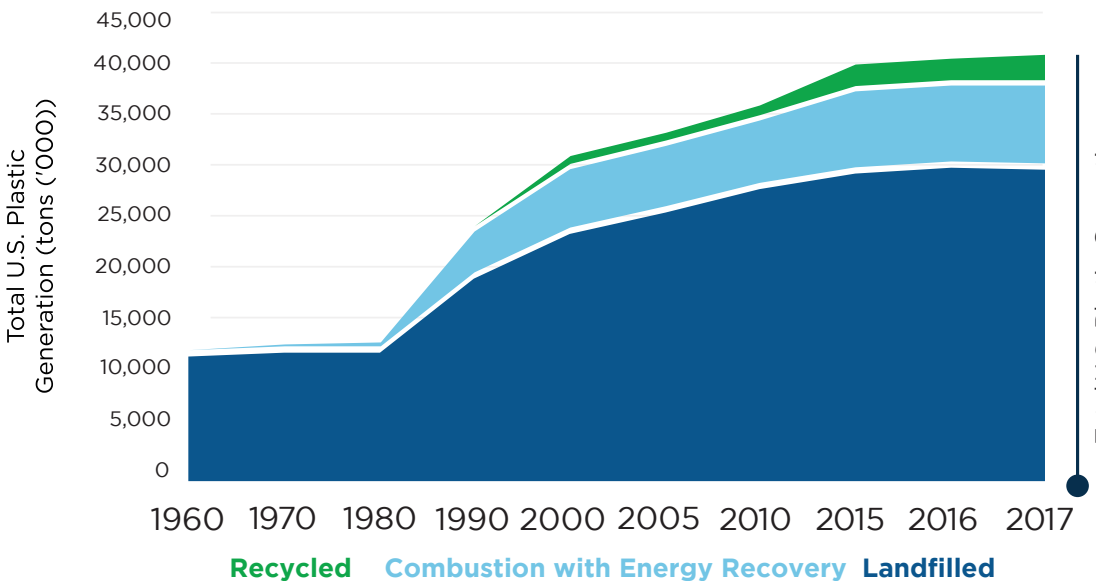
Food waste is the most prevalent material reaching landfills.[36] When food is disposed of in a landfill it rots and becomes a major source of methane, which, according to the Environmental Protection Agency, is 25 times more potent greenhouse gas than carbon dioxide.[37] Landfills are the third biggest producers of methane in the U.S. If food waste was represented as a country, it would be the third-biggest greenhouse gas polluter after the U.S. and China.[38]

Plastic packaging extends the life of perishable foods, which travel from fields where they're grown, to storage facilities for processing, to stores for selling, to homes for consumption. This product lifecycle can take days or weeks depending on the product, supply chain logistics, how long the product takes to sell, and how long it takes to be consumed. Plastic packaging keeps these foods fresh throughout this lengthy supply chain, minimizing food waste and extending and expanding fresh food supply.

The use of just 1.5 grams of plastic to wrap a cucumber more than quadruples its shelf life from three days to 14 days.[39] Placing grapes in plastic bags reduces in-store wastage by 20%. Plastic packaging increases the shelf life of fresh meats to 21 days or longer, about ten times longer than store-wrapped meat.[40] Vacuum-packed meat reduces food waste by more than 75 percent.

Ten times more resources are needed to make and distribute food than package it.[41] Research by Zero Waste Scotland has found that the carbon footprint of food waste collected from Scottish households in 2016 alone was nearly three times that of plastic waste collected from people's homes.[42] A 2015 study concludes that this carbon benefit holds even when the packaging is not recycled.[43] According to the study's author, "Food packaging can make an important contribution to environmental protection. Without vacuum-packed plastic packaging, the environmental crisis of food waste would only increase."

Figure 6: Food Waste Management: 1960-2017



Source: U.S. Environmental Protection Agency

Plastic in perishable food packaging also has a direct impact on human health because of its impact on nutrition. Plastic packaging makes it easier and more efficient to get healthy fresh food to more Americans. Without it, the American health crisis, where more than two-thirds of adults are overweight or obese,[44] would get worse. Already, millions of Americans live in so-called "food deserts" where they cannot readily access healthy fresh food,[45] access to which would further diminish without plastic packaging.

According to a recent report[46] by the Centers for Disease Control, just 12 percent of Americans eat the minimum amount of fruit recommended per day, and only nine percent get the recommended amount of vegetables. According to the CDC:

> Because fruit and vegetable consumption affects multiple health outcomes, including cardiovascular disease, type 2 diabetes, some cancers, and obesity and is currently low among adults in all states and demographic subgroups, continued efforts are needed to identify and address barriers to fruit and vegetable consumption.

According to a University College of London study[47], people who ate seven or more servings of fruits and vegetables reduce their likelihood of dying from any cause over the next eight years by nearly half compared to those who ate less than one serving per day. The extremely low fruit and vegetable consumption among Americans is contributing to numerous public health problems.

Plastic packaging can help democratize fruit and vegetable consumption by keeping these foods fresh for longer, while also preserving the taste and appearance. Plastic packaging helps maintain

foods' natural flavor, look, and texture, lock in nutrients, lock out bad odors and flavors, and stave off freezer burn. These attributes make healthy food more appetizing, leading to more consumption and a healthier population.

Plastic packaging keeps out microbial invaders that are responsible for food spoilage. Bacteria live in all-natural environments and need nutrients and moisture to rapidly multiply and spoil food, according to the United States Department of Agriculture. When a moist environment exists, small colonies of millions of bacteria quickly form. These colonies are responsible for making fresh food quickly decay and become inedible.

It is no surprise that there's a correlation between the percentage of food that's wasted and the percentage that comes in plastic packaging. For instance, less than one-third of all fresh fruits and vegetables are sold in plastic packaging, yet roughly 40 percent are wasted. In contrast, the vast majority of meat and seafood is packaged and therefore it's only wasted at just single digit rates.[48]

Restricting the plastic used to protect perishable food would worsen food waste, emissions, and nutrition. Therefore, single-use plastics used for perishable foods must be exempted from any restrictions on single-use plastics.

Figure 7: U.S. Fresh Food Sales: Percentage Sold vs. Wasted

Source: American Chemistry Council

BOTTLED WATER

Water is life. And bottled water must be protected from single-use plastic restrictions or else human health and lives will be threatened. Bottled water plays an indispensable role during emergencies and in response to tainted municipal water supplies. Even a mere shortage is enough to cause health problems, panic, and rioting. Bottled water has a lack of environmentally friendly substitutes, yet has an excellent recycling potential.

EMERGENCIES

Like almost all emergencies, the COVID-19 crisis necessitated a vast bottled water response. Numerous state governors received emergency shipments of bottled water. Bottled water supplies at many stores across the country were liquidated. Even Amazon.com ran out of bottled water supplies periodically throughout the crisis. Field hospitals, quickly assembled to meet a surge of patients, often do not have safe drinking water capacity for patients, doctors, and staff, and they must rely on bottled water to fill the void.

Single-use plastic filled bottled water is the most important commodity during and in the aftermath of emergencies such as pandemics, hurricanes, floods, earthquakes, and terrorist attacks, which all can destroy or impair municipal water systems or cross-contaminate them with sewage lines. Such disasters can require people to become water self-sufficient for weeks or more. In a 4/2020 review of consumer ordering online at Walmart, "water" was the top searched product for preparation and during the COVID-19 crisis.

Emergencies don't always directly impact tap water capacity. Yet the integrity of water supplies may still be compromised due to secondary and tertiary consequences. In the COVID-19 crisis, for instance, the concern wasn't so much that coronavirus could contaminate tap water, but that employee absenteeism at water plants could impact the water supply and public health. If essential water plant employees got sick or feared getting sick, the tap water supply could be threatened and officials would need to fall back on emergency bottled water supplies. Single-use plastic bottled water, therefore, acts as insurance during pandemics and other emergencies.

Access to clean and potable water is vital for citizens and first responders following almost any emergency. There are roughly ten domestic emergencies per year that require a bottled water response.[49] Tens of millions of bottles of water have filled the void left by compromised municipal water systems over the years.

The U.S. government understands the importance of bottled water in emergency response. According to a Freedom of Information Act request, the Federal Emergency Management Agency (FEMA) has 18,090,680 liters of bottled water across its distribution centers. FEMA also recommends storing a two-week supply.[50] That's the equivalent of more than one billion water bottles distributed among the population of the United States. The Centers for Disease Control recommends that all households keep an emergency water supply of at least one gallon per person per day for three days.[51]

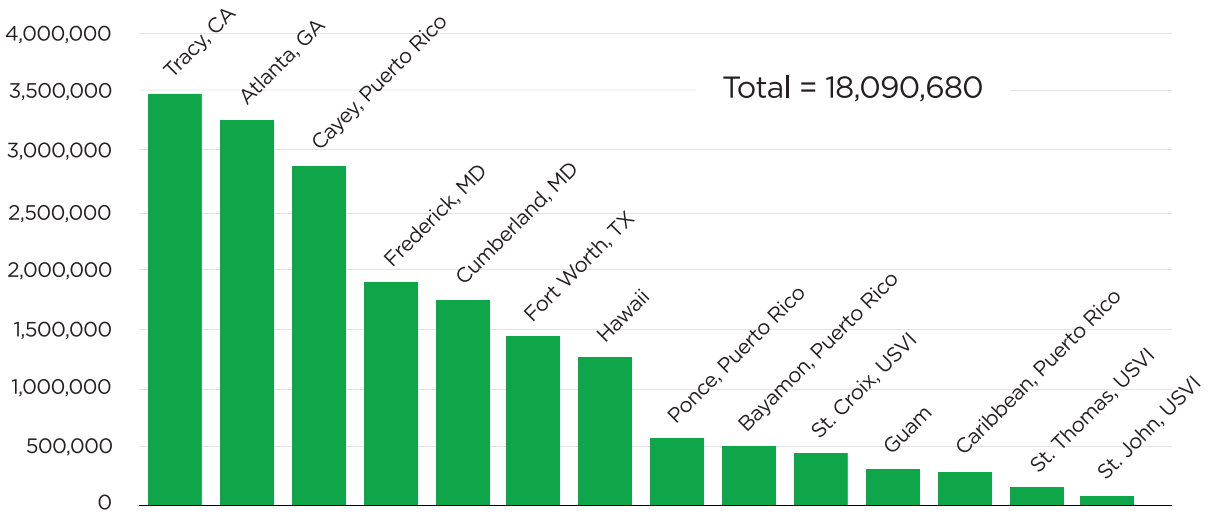
People don't always adhere to these recommendations. In the aftermath of Hurricane Maria in Puerto Rico in 2018, desperate survivors were forced to try to collect spring water from mountains and streams despite the health risks that such actions pose.

The demand for bottled water in response to natural disasters is only set to grow because of the consequences of climate change. The cost of natural disasters worldwide could reach $314 billion annually by 2030, a 26 percent increase from the current level of $250 billion, according to a World Bank report,[52] which cites worsening climate change as a key driver.

Bottled water is also necessary due to the elevated risk of terrorist attacks on municipal water supplies. In the aftermath of the September 11th terrorist attacks, the FBI identified municipal water systems as targets of potential terrorist attacks and noted their readiness to provide bottled water alternatives as part of their emergency response plans.[53]

Bottled water must be readily available to ensure steady water supply during emergencies. It is impossible to create the economies of scale necessary to ramp up production only in times of emergencies. Nor can fulfilling this vital bottled water role needed for human health be left only to government officials, who don't face the same incentives to produce quickly and at the highest quality when disaster strikes.

Figure 8: Number of Water Bottles by FEMA Location



Source: Freedom of Information Act Request, January 2020

COMPROMISED MUNICIPAL WATER SYSTEMS

As highlighted by the recent water crisis in Flint, Michigan, where 100,000 people were exposed to lead contamination of their tap water, even in the absence of a natural disaster, municipal water systems are frequently contaminated by toxins. These events make tap water undrinkable, and require bottled water supplies to fill in. Flint residents needed to turn to bottled water supplies for over 1,600 days,[54] and even though some officials have deemed the tap water finally safe to drink, many residents are unsure and continue to rely on bottled water.

Tap water systems often have quality problems that necessitate "boil water alerts" or the distribution of bottled water. There are approximately 500 of these per year in the U.S. In addition to Flint, high-profile lead contaminations of municipal water supplies have occurred in recent years in Fresno, CA, and Newark, NJ. In 2017, Portland's water officials found traces of cryptosporidium, a parasite that comes from infected feces. And Brady, TX faced widespread radium contamination.

Bottled water also responds to daily societal problems such as homelessness, house fires and family displacement. Several charities exist to distribute bottled water to the homeless. One group delivered 300,000 bottles of water to those in need in Houston, Ft. Worth, and Austin, Texas in one summer alone.[55] Bottled water is provided to food banks and soup kitchens on a daily basis across the country, serving the hydration needs of underserved communities.

In addition to these high-profile, high-toxic cases, emerging research suggests that municipal water systems are chronically comprised. The CDC estimates that annually, nearly 20 million Americans fall ill due to contaminated drinking water.[56]

The *Washington Post* reported that in one year alone, 274 water utilities serving 11.5 million consumers had violated the EPA's lead standard and that many cities, including major metropolitan areas such as Boston, New York, and Philadelphia, were out of compliance with EPA reporting requirements.[57] There are about six million lead pipes across the country, with 385,000 in Chicago alone. By 2020, the average water pipe in America will be 45 years old, with many being well over 100 years old.

The Environmental Working Group (EWG) has found 91 tap water contaminants linked to cancer, reproductive harm, cognitive dysfunction, and miscarriages in local water systems.[58] According to a Natural Resources Defense Council report, municipal water systems are routinely contaminated with the following agents: Fecal bacteria (10,261 water systems violations in 2015 affecting 18 million people); chemical disinfectants (11,311 violations affecting 25 million); nitrites and nitrates (1,529/4 million); lead and copper (8,044/18 million); radioactive nuclides (2,297/1.5 million), arsenic (1,537/2 million); and pesticides (6,864/3 million).[59]

Even when violations are reported to the EPA, the agency rarely takes formal enforcement actions. The Natural Resources Defense Council estimates that in 2015, the EPA acted on just 13 percent of over 80,000 violations that had been reported.

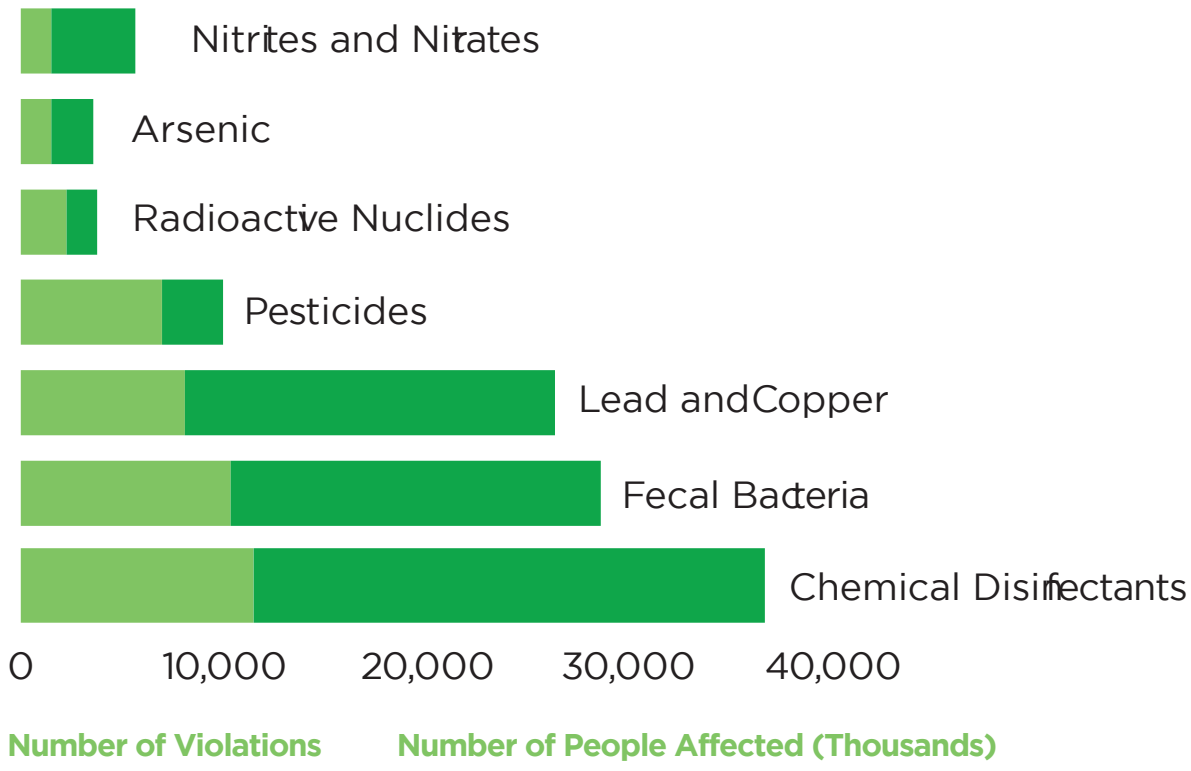
And just because contaminants fall below EPA regulated levels, that doesn't mean they are safe for human health. Contaminated water supplies pose a disproportionate threat to infants, the elderly, and those with weakened immune systems.

The EPA has not updated the tap water regulations in the Safe Drinking Water Act since 1996.[60] Some contaminants remain unregulated, putting Americans across the country at risk. Substances such as polyfluoroalkyl and perfluoroalkyl, known as PFAS, are a group of manmade chemicals that have been linked to serious health complications. These synthetic substances have seeped into waterways after being released by industrial, military, and firefighting operations.

EWG now believes PFAS are likely detectable in all major water supplies in the U.S.[61] Biomonitoring studies by the Centers for Disease Control and Prevention determined that nearly every Americans' blood is contaminated with PFAS.[62] EWG's tests also found chemicals from the PFAS family that are not generally tested for in drinking water. EWG tested samples from 44 sources in 31 different states and Washington D.C. and found that only one location had no detectable PFAS, and just two others had PFAS below the limit that's a risk to human health. Residents in many affected areas are turning to bottled water as a safe alternative.[63]

For health or philosophical reasons, some people do not like the fluoridation of their tap water. Nearly every American municipality fluoridates its water. Too much fluoride can cause a health condition called fluorosis, which affects nearly one-in-four Americans aged 6 to 49.[64] Bottled water offers these people a non-fluoridated alternative.

Figure 9: U.S. Water Violations by Category and People Affected in 2015



Source: NRDC

LACK OF ENVIRONMENTAL SUBSTITUTES FOR HIGH-VALUE PLASTICS

For reasons already discussed, such as sterility, safety, cost, and weight, there are currently no marketable substitutes for the high-value plastics used in healthcare. On the margin, single-use plastics could be reduced by ensuring – for instance — that basic tools like tongue depressors remain wooden. There are also promising efforts to replace plastic coverings of surgical tools with fabric.[65] Yet, for the vast majority of single-use plastics in this space, there remains no alternatives.

Similarly, there's no market alternative to plastic packaging for perishable foods that can create a vacuum environment to preserve fresh food from spoilage. Again, on the margin, there's room for some fresh foods in the produce aisle that don't need to be sealed to be put in paper or reusable fabric bags. Baked goods can go into bakery boxes rather than plastic bags. But to prevent food waste and promote good nutrition, plastic packaging remains vital.

When it comes to plastic water bottles the story is more nuanced. In some water contamination cases, bulk water in large reusable containers may serve as an alternative. But for the sick, disabled, and elderly populations, these bulky containers are too heavy and cumbersome to maneuver. They also don't offer the flexibility or ease of transport as traditional single-use bottles.

Some environmentalists believe that plastic bottled water can be substituted with aluminum, glass, or "boxed" alternatives. Yet those who believe that these options are better for the environment than standard plastic bottles are falling prey to a widespread phenomenon known as "greenwashing" -- where industries attempt to profit by the appearance of offering green alternatives.

In reality, aluminum, glass, and boxed water are worse for the environment than plastic bottles.[66] Some environmentalists argue that aluminum cans, which are lined with plastic, are better for the ocean because they don't contribute as much to plastic pollution. But this overlooks the role that aluminum mining and production have in raising carbon emissions, which are warming the oceans and creating acidification that poses a greater threat to coral reefs and sea life than plastic.

Bauxite mining, which is necessary for aluminum, causes widespread environmental destruction and carbon pollution. Vast power is needed in the smelting process. Due to this process, aluminum cans produce triple the amount of carbon dioxide of a plastic bottle.

Additionally, aluminum cans are over four times the material weight of water bottles for the same amount of liquid, meaning they take more energy to produce and more energy to transport.

The most obvious drawback of glass water bottles is breakability. This threat makes glass bottles a bad choice in emergency situations where versatility is necessary. Glass bottles are also very heavy compared to plastic and aluminum and require more cardboard when packaging– leaving a significant carbon footprint during transportation. In fact, glass is about 25 times heavier than plastic.

Boxed water brands generally market themselves as a more sustainable portable water option, but the nature of their packaging prevents them from being recycled. So-called boxed water is not made of simple cardboard-like its proponents suggest**.** It's actually a mix of paper, plastic, and aluminum that cannot be recycled by the vast majority of recycling centers because separating the materials generally is not possible without specialized equipment. The volume of boxed water consumption is so small that most municipal recycling programs don't find it worthwhile to try separating these containers from landfill waste.

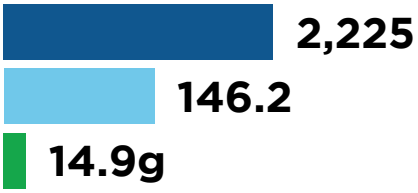
Darby Hoover, a senior resource specialist at the Natural Resources Defense Council says, "it's a little bit ludicrous to put your water in a carton and claim that that is more sustainable than putting it in a plastic bottle which is, in fact, more readily recyclable."[67]

Plastic is comparatively environmentally friendly.[68] Plastic water bottles produce about one-third the carbon dioxide of boxed water, one-sixth the carbon dioxide of glass, and one-twelfth the carbon dioxide of aluminum cans. Plastic water bottles are recycled at more than double the rate of boxed water.[69]

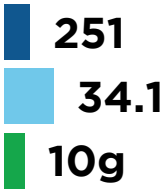
Plastic water bottles make up less than one percent of all the plastics produced in the United States.[70] Soda, sports drinks, and enhanced waters generate nearly 50 percent more carbon dioxide emissions per serving than bottled water, while beer, juice, and milk create nearly three times as many carbon emissions.

Figure 10: Environmental Impact by Container Type

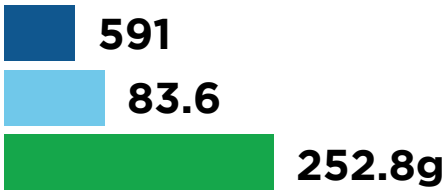
Aluminum Can
Common drinks: soda, beer and juice.



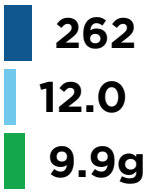
Carton/Box
Made from multiple laminated layers: plastic, paper & foil.



Glass
Drink containers: soda, beer & wine bottles.



PET Plastic (bottled water)
Stands for "polyethylene terephthalate" - a form of polyester.



Legend

- BTUs/container - BTUs are British Thermal Units, a unit for measuring energy use. Figures show how many BTUs are used to make one container — averaged from all sizes within container type.
- Metric Tons of CO2 equivalent/1,000,000 containers - The amount of greenhouse gases emitted by producing 1,000,000 containers.
- Packaging weight in grams (average weight for a single serve container).

Source: RecyclingFacts.com

RECYCLING POTENTIAL

Plastic beverage bottles are the most recycled plastic product in the U.S.[71] Recycled water bottles do not face the food and oil contamination problems that plague recycling efforts for other plastics. There are still strong domestic and foreign recycling markets for clean plastic water bottles that can be easily broken down and reused for other products.

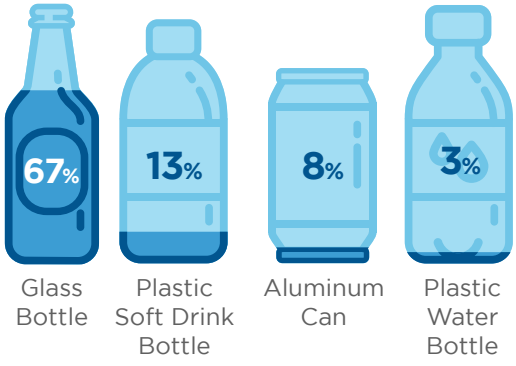
James Rubin, CEO of Enviro Waste says, "a batch of separated PET (#1) bottles that are clean is easily heated and broken down to be made back into a water bottle." He continues, "a batch of separated PET (#1) bottles that aren't clean enough can be broken down, heated, and turned into fiber (aka polyester) for clothing or carpets."[72] Recycling just five plastic bottles is enough to create one square foot of carpet fiber.

Plastic water bottles make up just 3.3 percent of all beverage containers that end up in landfills. The recycling rate for plastic bottled water containers has more than doubled in the last nine years to nearly 40 percent.[73] That's about four times higher than the overall plastic recycling rate. Doubling this recycling figure again would be equivalent to taking millions of cars off the road.

A February 2020 report by environmental group Greenpeace also makes the case that plastic beverage bottles are distinguishable from lower-value plastics in terms of recycling. Greenpeace finds that the U.S. has "sufficient" reprocessing capability for plastic bottles and that the public has access to municipal collection of such plastic. The group finds other plastics, such as polypropylene (straws, coffee cup lids), are lacking in these regards and should not be considered recyclable.[74]

By encouraging consumers to recycle even more of their plastic water bottles, policymakers can significantly cut down on the number that end up in landfills. This should be a much easier lift in a world where consumers aren't also inundated with low-value, single-use mixed plastics that have little-to-no recycling potential. Additionally, with less mixed plastics clogging up recycling centers, the price of recycling for bottles would get bid up, encouraging even more recycling.

Figure 11: Percent of All Beverage Containers that End Up in Landfills



Source: U.S. Environmental Protection Agency

CONCLUSION

Policymakers, environmental groups, and concerned citizens have the opportunity of a lifetime to reduce single-use plastic pollution that is contributing to ocean pollution and threatening marine life. Yet in their zeal to address the problem, they must recognize that all single-use plastic is not created equal. Rather, it comes according to a hierarchy of value.

To have the biggest impact on plastic pollution, while protecting human health, policymakers should address low-value, single-use plastics. This plastic could be reduced or substituted with little-to-no consequences for consumers. Plastic straws, superfluous Amazon.com packaging, and plastic take-out containers (especially black plastic that cannot be recycled) are prime targets for public initiatives and environmentally friendly alternatives.

These low-value value plastics may be an example of a market failure because their artificially low price doesn't reflect their full environmental impact. Therefore, it is a legitimate use of government to address their overuse.

Just as importantly, policymakers must protect high-value single-use plastics from zealous restrictions. These plastics, used in healthcare, perishable food, and bottled water, are essential for human life and must be protected at all costs. Exemptions must be made for these plastics in tandem with any single-use plastic initiatives.

Fortunately, greater recycling efforts can control much of the environmental impact of this narrow set of high-value plastics. This is especially true for plastic water bottles, which are among the most recyclable and highest-value recyclable products on earth. With less low-value plastic waste, the market for plastic recycled products should improve. However, policymakers and environmental groups should encourage greater recycling efforts.

By following this plastic policy framework, which recognizes that all plastics are not created equal, the U.S. can reduce plastic use and alleviate the environmental impact on the oceans without threatening human lives. Such an approach will allow sea turtles and humans to breathe freely for generations to come.

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ALL SINGLE-USE PLASTICS ARE NOT CREATED EQUAL

Essential Plastics Coalition

Protecting High Value Plastics