Ocean Conservancy®

Collective Currents

Global Solutions to End Ocean Plastics

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Executive Summary

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The global plastic pollution crisis—driven largely by the widespread use of single-use, disposable plastics—poses urgent threats to ecosystems, human health and, due to the emissions associated with plastics production, climate stability. Plastics now permeate every aspect of the environment, and after they break down into microplastics, they contaminate the air we breathe, the food we eat and the water we drink. Scientific evidence underscores the dangers posed by plastics across their entire lifecycle, from extraction and production to disposal, whether through incineration, dumping or mismanagement.

A critical driver of the crisis is the imbalance between plastic production and waste management, particularly in high-income countries. The United States, for example, generates approximately 17% of global plastic waste despite representing just 4% of the world's population. Recycling remains largely ineffective, with less than 9% of U.S. plastic waste sorted for recycling and an even smaller share actually reused in meaningful ways. Much of this recyclable material from the Global North has historically been exported to countries in the Global South, where waste infrastructure may be insufficient. Yet these recipient nations are often mischaracterized as the primary sources of plastic pollution, masking the underlying dynamics of global waste flows and environmental unfairness.

> **Addressing plastic pollution demands a systemic, equitable and globally coordinated approach.**

Reducing plastic production and consumption—especially in high waste-generating countries—is essential to alleviating pressure on waste systems and supporting more just, sustainable outcomes.

As global negotiations on a plastics treaty continue to stall, the importance of sub-national leadership has never been greater. Cities, states and regions have long been at the forefront of efforts to combat plastic pollution—introducing plastic bag bans, limiting single-use items, and promoting reduction and reuse well ahead of national or international frameworks.

These sub-national governments are often directly responsible for managing local waste systems, putting them in the ideal position to take effective action. Their proximity to communities enables them to design and implement zero waste strategies tailored to specific needs and ambitions.

Regardless of what a future global plastics treaty may contain, its success will ultimately depend on effective implementation. That responsibility will not lie with national governments alone but will also fall to sub-national entities—provinces, regions, cities and towns. While plastic pollution is a global issue, its consequences are acutely felt in local environments—clogged waterways, overburdened waste infrastructure and threatened communities. Strong local action is essential to safeguarding the ocean and the environment that sustain us all.

Local zero waste initiatives can serve as building blocks for broader success, creating a ripple effect that supports the long-term impact of a global treaty. By sharing lessons learned and demonstrating real progress, pioneering sub-national governments can influence higher levels of decision-making and inspire others to follow suit. In filling the gaps left by an incomplete treaty, these efforts also offer tangible proof that systemic change is both achievable and scalable, helping drive future negotiations toward the bold outcomes our planet urgently needs.

The plastic pollution crisis is the visible outcome of a broken global-plastics economy and insufficient waste systems. In order to address this crisis, it's important to consider the entire lifecycle of plastics—from fossil fuel extraction to disposal—and look to comprehensive, systemic solutions. The three pillars essential to ending plastic pollution are 1) targeted cleanups, 2) comprehensive plastics policy reform and 3) locally driven zero waste systems.

This report outlines how a right-sized approach to tackling plastic pollution supported by catalytic funding can drive the transformational change needed for our ocean and the communities that depend on it.

Photo credit: Mohamed Omar

State of Knowledge

Plastic Pollution and Planetary Crises

Photo credit: Alyssa Schukar

The ocean is critical to all life on earth, regulating our climate, supplying food and supporting livelihoods around the world. Yet every part of this vital system —from the deepest trenches of the ocean to Arctic snow—has now been touched by plastic pollution. An estimated 11 million metric tons of plastics flow into the ocean each year.[1] Ocean plastic pollution doesn't just come from beaches and coastal communities. Plastics enter the ocean from rivers, canals and storm drains, which means pollution can start far upstream and miles inland.

Approximately 40% of annual plastic production is used for plastic packaging, and these lightweight and single-use plastic items contribute an outsized amount of pollution to communities and the ocean. Across the world and over the course of 40 years, the items that consistently top the list of what volunteers with Ocean Conservancy's International Coastal Cleanup® collect are single-use plastic packaging and foodware. Once these plastics enter the ocean, they harm wildlife, enter the food chain and water supply, and disrupt the ecosystem services the ocean provides[2] like climate regulation and coastal resilience, healthy fisheries, and cultural and economic livelihoods that rely on a healthy, thriving ocean.

From fossil fuel extraction for plastic production to the toxic impacts of plastic waste on ecosystems and human health, plastics intensify the interconnected planetary crises we face today—climate change, biodiversity loss and plastic pollution. At the core of these interconnected planetary crises is our ocean.

Plastics and Biodiversity

From ingestion and entanglement to chemical exposure, plastic pollution impacts marine biodiversity in countless ways. From the smallest plankton to the largest whales, nearly 1,300 marine species have been documented to ingest plastics—a number that continues to rise. This list of species includes every family of marine mammals and seabirds and all seven species of marine turtles.[3] Animals frequently mistake plastics for food.

These ingested plastics can also be transferred up the marine food web into predatory species, including many that are consumed by humans as seafood.[4] Further, plastics attract bacteria and can concentrate legacy (e.g., DDT) and other chemical contaminants (e.g., pharmaceuticals and heavy metals) from the environment up to a million times higher than surrounding seawater[5], posing a contamination risk to marine life and human seafood consumers.

Like ingestion, entanglement is a leading cause of plastic-related harm to marine wildlife. Peer-review science co-authored by Ocean Conservancy scientists showed that abandoned, lost or otherwise discarded fishing gear (ALDFG)—like nets, line, ropes and pots—is the top entanglement threat for marine life, with consumer products like plastic bags and balloons also causing entanglement harm.[6] ALDFG and other entangling plastics ensnare marine animals, causing injuries or restricting an animal's ability to forage, move or breathe. In many cases, this interaction results in death. And because fishing gear is intentionally designed to catch or trap targeted marine animals, once it becomes lost or discarded it continues to do so indiscriminately for decades to come.

Despite increasing awareness and concern for the impacts of plastic pollution on wildlife and marine ecosystems, scientists project plastic pollution in the ocean will triple by 2040 if dramatic action is not taken. Understanding the full suite of biodiversity impacts due to ocean-plastic leakage at current levels and predicting impacts under expected future scenarios are essential to targeting conservation efforts and driving policy changes aimed at mitigating further harm to marine wildlife.

How much is too much? Modeling Mortality Risks of Plastic Ingestion for Marine Life

Ocean Conservancy scientists recently developed models based on more than 10,000 necropsy datapoints that estimate the likelihood of mortality for sea turtles, seabirds and marine mammals by the amount of plastic found in their gastrointestinal tract. Of the individual animal necropsies investigated, 36% of seabirds, 14% of marine mammals and 50% of sea turtles consumed plastic. Harrowingly, **one in twenty of all sea turtles** in the research's database died specifically from plastic ingestion. When lethality thresholds were calculated for various plastic types (hard plastics, soft plastics, rubber, fishing debris) and species groups, Ocean Conservancy scientists found that as few as three pieces of rubber (as in shreds from a burst balloon) will cause death in 90% of average-sized seabirds.[7]

This research represents the most comprehensive mortality risk assessment conducted for macroplastic ingestion to date, building extensively on previous work both in terms of the sample size of individuals considered and the complexity of the modeling approach. The findings emphasize the risk macroplastic pollution poses to animal health, and that risk varies by animal and plastic type—critical for informing future research and policy on plastic pollution.

Plastics and Communities

Since 1986, volunteers with Ocean Conservancy's International Coastal Cleanup® (ICC) have removed nearly 410 million individual debris items from beaches, waterways and coastal communities, all while collecting data on the types of items found. More than 90% of all pollution items collected through the ICC over the past four decades have been made of plastics. Consistently across the globe, single-use plastic packaging and foodware are among the top ten most commonly retrieved items.

At the same time, data from global waste characterization assessments show that 18 of the top 20 most common plastic pollution items littering communities were food packaging, primarily food wrappers, beverage bottles and food containers.[8] Of those materials, for which there is no safe and viable recycling option, which are also referred to as residual plastics, plastic sachets are particularly pernicious. An estimated 855 billion sachets, tiny single-use, single-serving packets of everyday consumer goods like soap, shampoo, or coffee, are sold globally each year,[9] polluting communities across industrializing economies, such as India, the Philippines, Indonesia and beyond. These plastics pose significant risks to coastal and landlocked communities alike. Toxic chemicals leached from plastics through dumping or burning contaminate the air, soil and water, posing severe health risks to communities.[10] Recent research suggests that of the known chemicals associated with plastic packaging, 3,310 distinct chemicals are known to be toxic to specific organs, carcinogenic or toxic for reproduction, or endocrine disrupting,[11] with 63 distinct chemicals identified in a related study ranking highest for human health hazards and 68 for environmental hazards.[12] Further, many of the bioplastics that are increasingly touted as better alternatives to single-use plastics contain a similar proportion of chemicals of concern as their fossil-fuel based counterparts.

Additionally, plastic debris can obstruct waterways and contribute to flooding, increasing the risk of property damage and displacement.

Photo credit: GreenHub

TOP 10 ITEMS REMOVED

International Coastal Cleanup®

1986 - 2024

1. Cigarette Butts — 64,434,166
2. Food Wrappers (candy, chips, etc.) — 31,649,791
3. Beverage Bottles (Plastic) — 25,628,872
4. Bottle Caps (Plastic) — 19,580,186
5. Straws, Stirrers — 15,864,865
6. Grocery Bags (Plastic) — 13,207,425
7. Beverage Bottles (Glass) — 12,059,501
8. Other Plastic Bags — 11,544,317
9. Beverage Cans — 11,300,727
10. Cups, Plates (Plastic) — 8,463,332

Protecting communities from the dangers of plastic pollution is essential for maintaining their economic stability and environmental resilience. The accumulation of plastic waste along shorelines and in the ocean can damage local fisheries and tourism, both vital economic sectors for coastal communities. One study found that 90 U.S. west coast communities across California, Oregon and Washington spent more than $520 million annually to address litter and prevent trash from entering the ocean and waterways.[13]

Another study found that doubling the marine debris on Alabama beaches, as anticipated under current projections, would result in $113 million lost in tourism revenue and 2,200 fewer jobs.[14] Taking into account ecosystem damages, tourism losses, impacts to fisheries and the loss of other economic benefits of the ocean, plastic pollution is estimated to cost $500 billion to $2.5 trillion in the global economy every year.[15]

Plastics and Climate

Plastics are derived from fossil fuels, and the extraction, refining and manufacturing processes release large amounts of dangerous greenhouse gases like carbon dioxide and methane into the atmosphere. When plastics are incinerated through chemical recycling or waste-to-energy processes such as refuse-derived fuel, they release additional greenhouse gases, further exacerbating global warming.[16, 17, 18]. In fact, plastics drive over 5% of global greenhouse gas (GHG) emissions and 12% of oil demand—more than global aviation. The majority of GHG emissions from primary plastic production occur even before polymerization, and at a conservative scenario of 2.5% growth per year, primary plastic production will consume 21-26% of the remaining global carbon budget to limit global warming to 1.5°C by 2050.[19]

The accumulation of plastic waste in natural environments, particularly in the ocean, also inhibits ecosystems that play a vital role in carbon sequestration, such as in mangroves.[20]

Plastic resin producers are facing pressure to decrease GHGs and a shrinking market for other fossil-fuel products because of a shift to renewable energy. Chemical recycling[1] and similar processes have been marketed as ways purportedly to offset carbon emissions while allowing continued unabated production of virgin resin. With the pressure to increase the amount of recycled content in products, plastic producers are determined to ensure any definition of recycling includes chemical recycling and related technologies so they can continue selling virgin resin to manufacturers who can claim recyclability.

End-of-life processes that do not recover plastic materials (i.e., aren't "plastic-to-plastic") should not be considered recycling and only serve to delay the systemic changes needed to build a circular economy. Any end-of-life treatment for plastics that leads to harmful emissions (including GHG emissions) into communities, air or waterways is not sustainable and should not be considered part of the circular economy. Focusing on misleading solutions like chemical recycling, refuse-derived fuels, waste-to-energy processes or similar "quick fixes" only delays a truly circular economy and prolongs community and environmental harm.

1 Ocean Conservancy considers chemical recycling technologies harmful if they do not recover plastic and do create environmental and societal harm. Learn more about our position on chemical recycling here.

A Stalled Global Plastics Treaty: The Case for Local Leadership and Solutions

On March 2nd, 2022, the United Nations Environmental Assembly (UNEA) agreed on a resolution under the name “End plastic pollution: Towards an internationally legally binding instrument.” Through this resolution, countries agreed to commence a process to negotiate a new agreement on plastic pollution, including in the marine environment.

The timeline was established as five in-person meetings of the intergovernmental negotiating committee (INC), with intersessional work among them, and a commitment to having a draft agreement by December 2024.

Despite growing urgency and public pressure to end plastic pollution, the INC fell short on its mandate to deliver a draft agreement in December 2024 and instead was forced to resume the fifth session of negotiations (INC-5.2) in August 2025. Over 2,600 delegates representing 183 Member States and more than 400 observer organizations gathered at the Palais des Nations in Geneva, Switzerland, for INC-5.2 with the sole mandate to finalize the treaty text. Despite ten days of negotiations and two new draft iterations presented by the INC Chair, consensus could not be reached. Instead, Member States reiterated their commitment to continuing the process, and agreed to continue negotiations at a later date, yet to be determined.

In the latest text out of INC 5.2, the treaty prioritizes managing plastic waste rather than fulfilling its original mandate: ending plastic pollution. Without ambitious commitments to reduce plastics at the source, the international community risks missing a critical opportunity to address one of the most pressing environmental challenges of our time.

Several weeks after the conclusion of INC 5.2 the INC Chair announced his resignation, leaving treaty negotiations in a period of acute instability. With no consensus on a final text and the election of a new INC Chair to occur in February 2026, the role of sub-national leadership has never been more critical. Cities, states and regions have long been leaders in tackling plastic pollution—pioneering plastic bag bans, restrictions on single-use items and incentives for reduction and reuse well before national or global frameworks have caught up. Sub-national governments are often directly responsible for managing waste and are, therefore, best positioned to design and implement effective solutions that reflect the realities and ambitions of their communities. Local civil society organizations are on the frontlines of keeping communities, beaches, waterways and our ocean free of plastic pollution through relentless prevention, mitigation and cleanup efforts.

There is no time to wait, however. Twenty-three million metric tons of plastics enter the global aquatic ecosystem annually. This massive amount is expected to more than double by 2030 if we do not change our relationship with plastics. To avoid this fate, and while the international community deliberates its next steps for the INC process, urgent and coordinated action must be taken now to reduce, manage and mitigate plastic pollution.

Right-Sized Approaches

Photo credit: Rodrigo Fonseca

To achieve the ambition science shows is essential, we must focus on three core strategies:

1. Targeted cleanup of legacy waste
2. Robust extended-producer responsibility and source-reduction policies
3. Zero waste systems tailored to local contexts

The implementation of each solution will vary based on regional factors and must be guided in partnership with local leaders.

At its core, this plastics crisis, as well as the climate crisis it helps fuel, is a symptom of a much larger failing—the entire system of how we make, use and dispose of products and packaging that's intentionally designed to be wasteful at the expense of our ocean, our climate and our communities. For far too long coastal communities, especially in the Global South, have been forced to confront tidal waves of plastic pollution. But from crisis comes opportunity, and these frontline communities are the source of locally appropriate, proven solutions. Communities at the forefront of advancing comprehensive plastics reduction policies and cities leading on zero waste from mountaintop to shoreline all have the expertise to be drivers of change.

Targeted Cleanup

Among the strategies to address plastic pollution, cleanup efforts—recovering plastic waste from the environment—are often seen as less important than preventing pollution at the source. While prevention is essential, it is critical to remember that plastics already in the environment don't just go away. They linger, break down into micro- and nano-plastics, and continue to cause ecological and social harm.

Cleanup is critical to reduce the ongoing ecological, economic and social impacts—both now and in the future. However, to address such a massive problem, we need to approach cleanup of legacy-plastic pollution strategically and efficiently.

Photo credit: Rodrigo Fonseca

Targeted cleanups that concentrate resources on areas with high ecological, cultural or economic value are essential. Biodiversity hotspots, such as coral reefs, mangroves and estuaries, are particularly vulnerable to plastics and other pollutants, and focusing cleanup efforts on these critical areas prevents harm to ecosystem health and resilience, protects heritage and cultural artifacts, and sustains communities that depend on clean waters for their livelihoods. By focusing on regions where the environmental, social and economic stakes are highest, cleanups become a critical tool to mitigate damage, maintain ecosystem services, and preserve cultural and economic assets for future generations.

Targeted cleanups are also cost-effective, leveraging data and local knowledge to prioritize efforts where the impact will be most significant and interventions most precise and resource-efficient. Such impactful cleanups require genuine and strong connections to local leaders and strong partnerships around the globe to identify sites, develop collaborative strategies, and activate allied groups in the effort.

Adhering to this approach is also critical when deploying trash traps as a means of targeted cleanup. Trash traps are devices engineered to remove plastic waste from aquatic environments. Their designs vary widely, from basic river barriers to autonomous robots that patrol and clean beaches. These technologies are increasingly deployed alongside manual cleanup efforts, offering continuous operation to tackle pollution on land and in water. They're especially valuable in areas that are hazardous or hard for humans to reach. When planning to implement a trash trap, it is essential to engage in thorough coordination and consultation with the local community. This ensures the solution is locally supported and that its design is appropriately adapted to the specific environmental, cultural and economic conditions of the targeted cleanup area.

Cleanup efforts address plastic pollution's symptoms, but they also contribute to tackling its root causes. The rich data collected through citizen science efforts like Ocean Conservancy's International Coastal Cleanup® enable identification of major pollution sources and support targeted policymaking. For instance, cleanup data have been used to support legislation curbing single-use plastics in Canada and in

U.S. states such as Florida, Maryland and California. Cleanup data in the U.S. have also demonstrated that plastic bag bans correlate with significant reductions in bag litter. Beyond policy, cleanups serve as powerful educational platforms. Participating in cleanup events transforms abstract environmental issues into concrete, personal experiences—turning a distant news headline into a first-hand encounter. This hands-on involvement often leads to stronger support for policy change and more sustainable personal habits.

Strategically scaling up cleanup efforts is a dual-purpose strategy: It delivers tangible reductions in environmental harm now while strengthening the foundation for long-term, plastics source reduction both within local communities and on a global scale.

Making and Using Less Plastic

The science is clear: To tackle the crisis of plastic pollution and production we need to start with making and using less plastic in the first place. The simplest and most effective way to achieve this goal is through source reduction mandates—policies that require less plastic over time. A minimum 50% target for source reduction of single-use plastics by 2050 globally is a necessary and achievable target that can turn the tide on the existential threat of plastic pollution to our ocean and the communities that depend on it.

To avoid projected increases in ocean-plastic pollution, models show that by 2030 we need to reduce plastic consumption and usage by 25-40% depending on country income level.[21] Other studies have found that to achieve a roughly 80% reduction in ocean-plastic pollution, a 47% reduction (including direct efforts such as elimination and reuse and switching to non-plastic materials) by 2040 will be necessary.[22]

Single-use plastics (SUPs) are the ideal target for source-reduction policies as they represent the types of plastics that are most easily eliminated, replaced by alternative delivery systems (e.g., reuse and refill), or transitioned to more sustainable material types. As discussed previously, data from Ocean Conservancy's International Coastal Cleanup® show that the most common items polluting beaches and waterways around the globe each year are single-use plastics. Notably, nearly 70% of the most common items—which include plastic bags, straws, food wrappers and other single-use plastics—are not recyclable. Single-use plastics represent nearly 40% of annual plastics production globally and are one of the fastest areas for growth in the sector. This means that a focus on single-use plastics reduction now can have an outsized impact on preventing pollution from across the plastics lifecycle (including litter and emissions) while also cleaning up our recycling streams to enhance the transition to a circular economy.

A 50% source reduction of SUPs would:

- Prevent the production of over **2.6 billion metric tons of plastics**.
- Prevent **10.8 to 11.5 billion metric tons of carbon dioxide-equivalent (CO2-e) emissions**, equivalent to taking every car on Earth off the road for 1.6 years.
- Shrink global single-use plastic production from 300 MMT in the business-as-usual scenario to roughly **77 million metric tons annually in 2050**.[23]

Effective Extended Producer Responsibility

Countries with extensive waste-management infrastructure, like the U.S., continue to struggle to effectively and efficiently manage their waste streams. For example, only 21% of residential recyclable material in the U.S. is ever successfully recycled, despite 73% of the country being serviced by recycling infrastructure.[23]

Ultimately, these systems suffer from a diffuse set of varying standards from production to disposal. A lack of shared required standards has resulted in overproduction, paltry recyclability rates, and a proliferation of harmful waste treatment strategies, like chemical recycling, and their associated costly infrastructure. For too long, many high-income countries in the Global North navigated poor domestic management of waste by exporting their "recyclables" to the Global South. As more countries are putting an end to this harmful practice, high-income countries like the U.S. are facing a reckoning on how to manage their outsized generation of waste.

The option to tear down and rebuild from scratch in places where extensive waste infrastructure exists is not viable. Instead, we must look to strong policy that is responsive to the changing nature of waste management and addresses loopholes in past policy to hold producers truly accountable for their waste and drive toward a zero waste future.

The Evolution of Extended Producer Responsibility to Meet the Challenge

Extended producer responsibility (EPR) for packaging is a policy approach well suited for countries with extensive waste-management infrastructure that makes producers of products responsible for the entire lifecycle of the packaging they put on the market, from design to disposal. Since its inception in the 1980s, EPR policy has evolved multiple times. The first EPR for packaging programs focused on "waste prevention and minimization" and sought to reduce disposal rates through increased recovery and recycling. While this application of EPR did result in reduced rates of disposal in landfills in many countries, in the same time period, waste incineration increased by 117%, undercutting the effectiveness of EPR policy and putting local communities at risk.[24] Indeed, systems with a high proportion of incineration tend to stall on improvements to recycling rates and waste generation. Despite lower landfilling rates, real gains in waste prevention and recycling remain elusive when waste is diverted to be burned.

This non-progress is compounded by the dirty truth of incinerating waste. When waste is burned, harmful toxins like dioxins, mercury, lead and fine particulate matter are released into the air. Toxic byproducts like fly ash, bottom ash and wastewater treatment sludge are emitted into the air, soil and water.[25]

Photo credit: Anja Brandon

What Is Chemical Recycling?

In the years since its rise in popularity, and to meet the demands of recycling standards, incineration technologies have evolved into purported recycling schemes. “Chemical recycling,” (also known as **advanced recycling** or **molecular recycling**) which is pushed as a solution to the plastic-pollution crisis and stagnant recycling rates, is an umbrella term for a suite of technologies that use non-mechanical processes to break down plastics. Chemical recycling can be roughly broken down into **three main categories**:

1. **Conversion technologies**
   These technologies, like pyrolysis and gasification, use high heat and pressure with limited amounts of oxygen to turn plastics into pyrolysis oil or synthetic gas. These technologies release 30-200 times more greenhouse gas emissions than mechanical recycling.

2. **Depolymerization technologies**
   These technologies, like solvolysis or methanolysis, use chemicals, enzymes, heat and/or pressure to break plastic polymers back into monomers (the building block for new plastics).

3. **Purification technologies**
   These technologies use chemicals and heat to dissolve and recollect the plastic without changing the basic molecular structure of the plastic polymer.

While they’re called “recycling”, conversion technologies do not recover plastics. They turn plastics back into fossil fuels while releasing harmful emissions like volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and other toxins into the air and water.

Chemical recycling has proved to be expensive, polluting and ineffective, with serious doubts about the quantity of plastic that these processes can meaningfully return to plastic packaging (i.e., plastic-to-plastic recycling),[26] and the actual rate of return produced by processes advertised as energy production.

For more, see Ocean Conservancy’s Learn More About Chemical Recycling.

Photo credit: Adobe Stock

In the first iteration of EPR policy, researchers and policymakers assumed that shifting costs to producers ("internalizing the cost of waste management") would sufficiently drive design changes in products.[27] This did not bear out to be true, and a new wave of EPR policy evolved to address this challenge using "eco-modulated fees."

Eco-modulated fees are charges that encourage companies to design packaging that is easier to recycle and better for the environment. They target specific features—like certain dyes, additives or shapes—that make recycling harder. The goal is to promote packaging that can be recycled more easily, is reused more often, contains recycled materials and gets recycled at higher rates. Unfortunately, fees paid by producers on single-use products have often not been enough to significantly impact profitability, resulting in a "pay to pollute" scenario especially if packaging is not recycled.

EPR policy again evolved to meet the challenge, and the newest EPR programs seek to dramatically reduce the amount of packaging *produced and placed on the market* with a specific focus on plastics. Newer policies also seek to ensure that all packaging—especially plastic packaging—can be truly recycled and that the flow of materials is tracked sufficiently to ensure responsible management of the material until it becomes new products/packaging.

> **These modern, updated EPR laws, such as SB 54 in California, and the Packaging and Packaging Waste Regulations in the European Union, can help drive reductions in packaging generation, increase adoption of reusable and refillable packaging, and ensure that where plastics are used, they are collected and managed responsibly to eliminate harm to people or environment.**

These most recent EPR policies are designed to directly address the loopholes of past policy and the reality of the current waste crisis. These policies include:

- **Specific recycling and reuse targets.**
- **Mandatory requirement that all packaging be mechanically recyclable.**
- **Improved equity and remediation for past harms of plastics.**
- **Responsible end-market tracking of packaging materials.**
- **Reduced rate of production for packaging.**
- **Stakeholder oversight of the program through an Advisory Board.**

California Senate Bill (SB) 54

Passed on June 30, 2022, California Senate Bill (SB) 54, also known as the Plastic Pollution Prevention and Packaging Producer Responsibility Act, is the first EPR legislation to include all the major elements the science says is necessary to tackle plastic pollution.[28]

Reduction in single-use plastics:

- Requires producers to reduce single-use plastic packaging and foodware by at least 25%, by both weight and item count, by 2032.
- Banned expanded polystyrene (EPS) foodware effective January 1, 2025.
- Provides CalRecycle with the authority to increase source-reduction mandates after 2032 if there is growth in single-use plastic packaging and foodware.

Holding producers responsible for establishing a circular economy:

- Requires that packaging producers of all materials take financial responsibility for the full lifecycle of their products through an extended producer responsibility (EPR) program.
- Requires that all single-use packaging and foodware actually be recyclable or compostable by 2032.
- Requires that all plastic packaging meet a 65% recycling rate by 2032.
- Defines recycling as maintaining materials in the circular economy, and excluding incineration, combustion, energy generation, fuel production or other plastics-to-fuel technologies (pyrolysis and gasification) to meet required recycling rates.

Protecting and restoring California communities and ecosystems:

- Requires that implementing regulations avoid disproportionate harm to disadvantaged, low-income, and rural communities in California, as well as vulnerable communities outside the state.
- Requires plastics producers to pay $500 million a year for ten years ($5 billion total) beginning in 2027 in environmental mitigation funds to remediate communities and environments impacted by plastic pollution.

> **When designed and implemented correctly, EPR policies can effectively hold producers to account while ensuring benefits flow to local communities in the form of funding, jobs and a healthier environment.**

Zero Waste Systems

Zero waste solutions are grounded in systems that prioritize redesigning production, consumption and disposal so materials are reused, repaired, composted or recycled at the end of life via methods that are safe for communities and the environment. These solutions create closed-loop systems where waste is minimized at every stage, focusing first and foremost on reducing unnecessary packaging and materials and designing materials to be entirely reusable, recyclable or compostable in locally available systems. In practice, zero waste systems help shift economies and communities toward sustainable-resource use while reducing pollution and conserving natural ecosystems.

Effective zero waste solutions may take different forms depending on local needs and resources. For example, in dense cities where space is limited, zero waste systems might emphasize centralized drop-off hubs or shared repair services, while rural areas may lean more on household composting and local reuse networks. Additionally, some communities may have existing methods of resource sharing or traditional organic packing materials that should be integrated into a zero waste system as opposed to being supplanted by one. Tailoring approaches to local contexts ensures that zero waste systems are practical, equitable and sustainable over the long term.

In the face of the enormity of this waste crisis, effective zero waste solutions are being put forward by communities and regional governments in geographies with less developed waste infrastructure that can divert as much as 81% of waste from landfills and incinerators through local management of collection, material recovery and accessible refill-reuse options.[29] While zero waste solutions are not unique to these geographies (i.e. similar zero waste initiatives also exist in countries with developed waste infrastructure), the opportunity they present in regions with less developed infrastructure is profound. Despite their proven effectiveness and the critical solutions they offer, the investment needed to scale these systems remains lacking.

Case studies from around the world show that applying locally relevant zero waste solutions backed by community leaders results in significant cost savings, job creation and waste reduction.

Photo credit: Nicholas Mallos

Capannori, Italy[30]

Tools used

- Early and frequent community consultation.
- Public education campaigns and incentives for residents, schools and businesses.
- Door to door collection and separation at source.
- Pay-as-you-throw waste policy where residents are charged proportionately to how much waste they throw out.
- Local re-use hub for repair and redistribution of goods.
- Local options for bulk purchasing of goods, stimulating local businesses and producers.

Impact #s

- 2M Euros saved in annual waste-management costs.
- 50 local jobs created.
- 40% reduction in waste generated per person/
- 90% waste separation at source.
- 90,000 bottles omitted from waste system per day via milk refill stations.

San Fernando, Philippines[31]

Tools used:

- Strong enabling policies (plastic-free ordinance, no sorting and no collection).
- Public education campaigns and incentives for residents, schools and businesses.
- Waste analysis and impact study.
- Partnership with community members on implementation.
- Monitoring and enforcement of policies.

Impact #s

- 160 community jobs created.
- 52% reduction in waste-hauling costs borne by the city.
- 58% reduction in cost of waste disposal (landfills and tipping fees).
- 579% increase in waste diverted from landfill over five years.
- Informal waste pickers organized into an association, earning a living wage with representation on the city board.

San Francisco, CA, USA[32]

Tools used:

- Strong waste reduction and diversion legislation.
- Partnership with waste-management companies to innovate new programs.
- Investment in a culture of recycling and composting through incentives and outreach.

Impact #s

- 9.2M pounds of food recovered.
- 17,000 tons of construction material diverted from landfill.
- 28,000 pounds of compost distributed.
- 1,732 city staff trained on zero waste principles.

Zero waste systems provide a critical opportunity to advance practices that tackle plastic pollution head-on and make a difference for the climate, the ocean, and the health and wellbeing of countless communities. These changes can be achieved by leveraging zero waste systems and infrastructure through the knowledge of local and regional experts. And ultimately, the success of these solution sets rests largely on their ability to match implementation to local contexts.

At present, however, regions ripe for zero waste solutions still face two critical challenges:

1. Lack of appropriately targeted capital investment.
2. Eagerness to apply costly solutions that don’t address real needs.

1 Lack of appropriately targeted initial capital investment

The timidity of investors bears itself out in the spread of funding made available for waste management infrastructure and improvement.

As reported by the Circulate Initiative, “Nearly 90% (US$142 billion) of all investment in plastics circularity went to North America and Europe,” regions with highly developed existing waste- management infrastructure. On the other hand, Latin America, Asia and Africa receive a tiny fraction of investment despite carrying a disproportionate burden of the world’s waste.

Banks and corporate investors make up 68% of total investments and typically invest in large businesses with well-established operations.[33] Not only do those businesses often lack the local knowledge needed to make meaningful changes on the ground, but they rarely focus on waste prevention and diversion measures, instead focusing solely on post-consumer management.

The reticence of investors to direct funds to local zero waste solutions means that they routinely overlook industrializing economies and upstream solutions, precisely where investment is needed most. Additionally, the investment size typically seen from the private sector often demands significant operational capacity from the recipient, making it too cumbersome and regulation-heavy for locally relevant agencies and entities to deliver on. These factors combined create a vicious cycle of investment overlooking the exact regions and communities that need the most investment and operating only in financial mechanisms that benefit large businesses ill equipped to apply the necessary local-level solutions.

Photo credit: Liyana Amira Salleh

2 Eagerness to apply costly solutions that don’t address real needs

Existing investment models, given their tendency to favor large well-established entities, result in a disproportionate amount of funding for downstream solutions, such as waste-processing facilities, collection networks and incentivized waste collection through waste value-chain pilots.

Between 2018-2023, only 4% of investment went to upstream solutions like refill/reuse infrastructure, while the overwhelming majority of investments focused instead on downstream waste management.[34] Not only is this pattern shortsighted, but when applied in countries with less industrial waste-management infrastructure, it risks replicating the problems embedded in existing waste-management systems and missing the opportunity to apply lessons learned to develop better systems at the outset.

Ultimately, these ill-fitting solutions often fail because they proceed without adequate consideration of the local context, and in doing so attempt to work around existing systems rather than with them. For example, many countries in the Global South rely heavily on waste workers and waste pickers as part of both formal and informal waste management. Instead of leveraging the skills and knowledge of these individuals and including them as a critical element of the waste-management structure, many proposed solutions ignore and sidestep them. In addition, many countries in the Global South have centuries-old traditions of using biodegradable packaging, such as bags and containers made of native fibers. Similarly, countries like the Philippines had reuse-refill systems dating back more than 500 years[35] which were replaced by a sachet economy beginning in the 1960s. Local efforts to bring back these traditional materials and systems have received little attention and funding.

When local contexts are ignored and local leaders are not engaged, proposed solutions flounder when it’s time for implementation.

Photo credit: Pier Nirandara

Scaling Zero waste Systems

Though rooted in local action, zero waste solutions are critical to tackling plastic pollution on a global scale. By showcasing practical, scalable models that reshape consumption habits and waste-management practices, these community-led systems can drive meaningful policy change and influence international agreements toward a zero waste future.

Strategic investment at the local level yields disproportionately high returns—funding robust public education campaigns, incentivizing sustainable practices among local businesses, and building essential infrastructure such as composting facilities, reuse hubs and refill stations. These components not only reduce dependence on single-use plastics but also create a strong, scalable foundation for broader implementation. To match the scale and severity of the plastic pollution crisis, a diverse and geographically expansive portfolio of projects is necessary[36] [37].

Catalytic capital is critical in these emerging markets to unlock the full potential of zero waste solutions, yet only 5% of private investments in circularity are currently directed here.[38] With the right funding, these solutions can be rapidly scaled to develop local circular economies, including community-led waste-management and inclusive recycling. Investing significantly in a stronger local implementation model would empower a broad network of projects to launch in parallel around the globe, building the collective momentum needed to challenge entrenched systems and drive large-scale, lasting change.

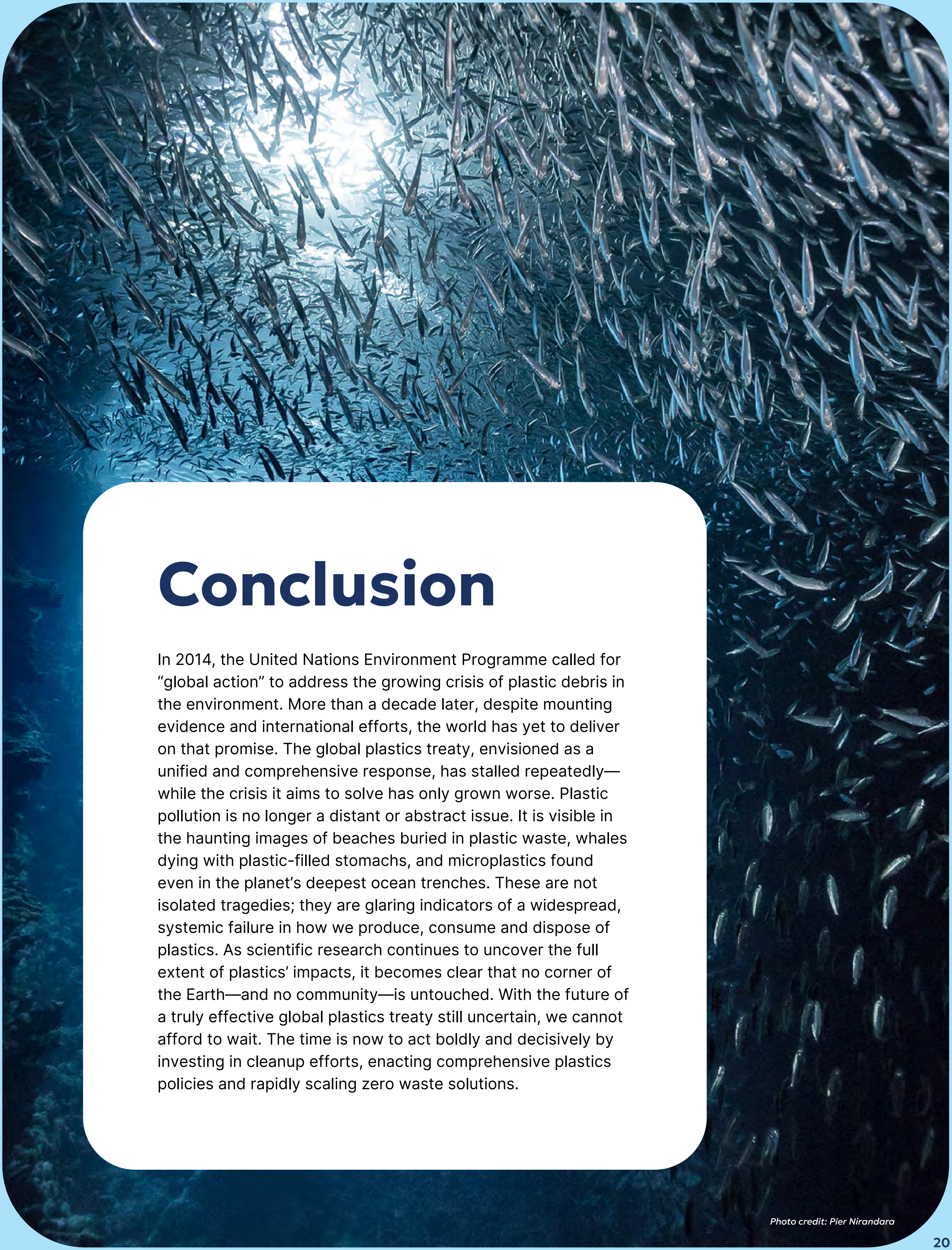
Zero Waste Systems and EPR, A Crucial Combination

For too long, zero waste systems and EPR have been seen in conflict. But if implemented correctly, they are not only aligned but mutually supportive by creating a policy ecosystem that enables and encourages zero waste solutions. Both EPR and zero waste systems are critical tools in the work against plastic pollution. Their proper application is guided by the user and the context, and both tools are needed to get us to the systems we need for a future free of plastic waste.

Regardless of the level of waste infrastructure in a particular geography, the goal of waste-system transformation is the same. For a livable future free from plastic pollution, we need systems and policies rooted in four key principles:

1. **Set effective targets** to ensure ambitious progress.
2. **Hold producers accountable** for their waste.
3. **Redesign systems and products** to support circularity.
4. **Ensure community inclusion,** including waste pickers and waste workers, in design and application.

> **The key to success is understanding the right combination of tools for each context. Strong relationships, thorough engagement of local leaders and locally relevant solutions from zero waste systems to EPR are crucial.**



Conclusion

In 2014, the United Nations Environment Programme called for "global action" to address the growing crisis of plastic debris in the environment. More than a decade later, despite mounting evidence and international efforts, the world has yet to deliver on that promise. The global plastics treaty, envisioned as a unified and comprehensive response, has stalled repeatedly—while the crisis it aims to solve has only grown worse. Plastic pollution is no longer a distant or abstract issue. It is visible in the haunting images of beaches buried in plastic waste, whales dying with plastic-filled stomachs, and microplastics found even in the planet's deepest ocean trenches. These are not isolated tragedies; they are glaring indicators of a widespread, systemic failure in how we produce, consume and dispose of plastics. As scientific research continues to uncover the full extent of plastics' impacts, it becomes clear that no corner of the Earth—and no community—is untouched. With the future of a truly effective global plastics treaty still uncertain, we cannot afford to wait. The time is now to act boldly and decisively by investing in cleanup efforts, enacting comprehensive plastics policies and rapidly scaling zero waste solutions.

Photo credit: Pier Nirandara

Annex

Shared Principles of Zero Waste & Extended Producer Responsibility

Underlying Principles	ZW Systems	Strong EPR Policy
Set effective targets to ensure ambitious progress.	Goal for zero waste.	Reduction and reuse targets.
Redesign systems and products to support circularity.	Zero waste infrastructure.	Redesign products. Ensure inclusive and effective recycling
Hold producers accountable for their waste.	Hold producers accountable. Responsible consumption habits.	Hold producers accountable through Producer Responsibility Organizations
Ensure a just transition by inclusion of community actors, including waste pickers and waste workers, in design and application.	Prioritize social/ environmental justice.	Prioritize a just transition through policy design and implementation

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