



THE RISE OF PLASTIC POLLUTION: Cause, Consequences and Solutions

Plastic pollution is the accumulation of plastic in the environment, causing harm to ecosystems, wildlife, and human health. It's a global problem with a wide range of sources and impacts. Every day, the equivalent of 2,000 garbage trucks full of plastic are dumped into the world's oceans, rivers, and lakes. Every year 19 – 23 million tonnes of plastic waste leaks into aquatic ecosystems, polluting lakes, rivers and seas. Plastic pollution can alter habitats and natural processes, reducing ecosystems' ability to adapt to climate change, directly affecting millions of people's livelihoods, food production capabilities and social well-being. Plastics bring undeniable benefits from energy savings to material conservation. Yet, the growing crisis of plastic pollution threatens both planetary and human well-being. For decades, plastic pollution has infiltrated every corner of the world contaminating the water we drink, the food we eat, and the air we breathe. Microplastics are now even found in our bodies. This World Environment Day, we are mobilizing communities across the globe to implement and advocate for lasting solutions to plastic pollution.

IMPACTS OF PLASTIC POLLUTION

Plastic pollution has become ubiquitous in natural and built environments, raising concerns about potential harm to humans and nature alike. Once in the environment, plastic pollution is persistent and may take between 100 to 1,000 years or more to decompose, depending on environmental conditions. Once in the environment, plastic pollution can fragment into smaller pieces of plastic. Microplastics are plastic particles ranging in size from five millimeters to one nanometer; nanoplastics are plastic particles smaller than one micrometer. Both are found in every ecosystem on the planet from the Antarctic tundra to tropical coral reefs. Plastic pollution affects all land, freshwater, and marine ecosystems. It is a major driver of biodiversity loss and ecosystem degradation and contributes to climate change.

As plastic pollution is a transboundary issue, a global plastics treaty is needed to ambitiously reduce plastic production, phase out harmful subsidies, eliminate products and chemicals of concern, and adopt strong national plans and rigorous reporting and compliance mechanisms.

Environmental impacts

Plastic pollution poses a threat to the marine environment. It puts marine species at higher risk of

ingesting plastic, suffocating, or becoming entangled in plastic pollution. Research indicates that more than 1,500 species in marine and terrestrial environments are known to ingest plastics. The Organization for Economic Cooperation and Development (OECD) estimated that in 2019, plastic products were responsible for 3.4% of global greenhouse gas emissions throughout their life cycles, with 90% of these emissions coming from the production and conversion of fossil fuels into new plastic products. OECD also reports that, unless human behavior changes, greenhouse gas emissions associated with the life cycle of plastic products are expected to double by 2060. The World Economic Forum projects that without intervention, the global plastics industry will account for 20% of total oil consumption and up to 15% of global carbon emissions by 2050.

Plastic waste is one of the most serious environmental issues of our time. It has been estimated that over 300 million tonnes of plastic is produced annually and around 14 million tonnes of plastic end up in the oceans around the world. Not to mention the tonnes of plastic that end up in landfill or into the general environment each year. This can lead to the contamination of both land and water with plastic debris. To make matters worse, plastic does not degrade easily and can stay in the environment for a long time. Depending on the plastic it can take between twenty and five hundred years for the plastic to decompose. The plastic waste problem has been around for many years, but it is only recently that people have started recognizing it as a major environmental issue that needs to be addressed.

One of the main causes of plastic pollution is by the use of single use plastics. Common single use plastics include water bottles, straws, food containers, plastic bags and plastic packaging. As the name suggests this type of plastic is designed to be used once and then disposed of. This has the potential to cause a number of issues. While single-use plastics have made our lives convenient, this has come at a cost.

One of the big problem relates to the improper disposal of plastic. Much of the plastic waste comes from the single-use plastic types which are not always recycled. As a result, these plastics accumulate in the environment and ultimately cause plastic pollution. According to our



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world in data, 55% of these plastics will end up in landfills and 25% while are destined for incineration.

It is estimated that incinerating plastic in a single year will dump 850 million tonnes of greenhouse gases into the atmosphere. Greenhouse gas emissions also occur when the plastic industry manufacture new plastics since they use fossil fuels in their construction. This means that when plastic is disposed of through incineration the harmful effects are duplicated at the start and end of its life cycle. When this life cycle consists of just a single use it means the plastic material has a high cost in terms of environmental impact and for climate change. However not all plastics are destined for incineration or recycling. Some do not even get that far and instead are dumped in the environment where over time they decompose.

Plastic waste accumulates in the oceans, lakes, and rivers, and can choke and suffocate aquatic life. As mentioned, plastic also contains various toxins, which can leach into the environment and contaminate water sources. This can cause serious health problems for animals and humans. While fishing gear is a big source of plastic and general waste pollution in the ocean other forms of plastic such as single use plastics are also major contributors. 20% of ocean plastics is from

sea-based sources, while 80% of the plastics found in the ocean are from land based sources.

Animals can ingest plastic and micro plastics have been found in the stomachs of marine life. The ingestion of plastics can cause the death of the animal, disrupting the lifecycle, food chains and the ecosystem that the animal is a part of. In addition to the plastic waste problem, there is also the problem of microplastics. Microplastics are tiny pieces of plastic, which are smaller than 5mm in size. These microplastics come from the breakdown of larger plastic materials, such as bottles and bags, and can accumulate in the environment. Recently, microplastic particles have even been found in human blood. The long term effects of this are still to be understood fully.

Once microplastics enter the environment they can be extremely difficult to deal with. Ultimately the best way to tackle issues surrounding microplastics is to address the tons of plastic that enter the environment in the first place through proper waste management, before they get a chance to break down into microplastics and cause environmental harm.

Human health impacts

According to the United Nations Environment Programme, microplastics have also been found in



human livers, kidneys, and placentas. Additionally, the International Union for Conservation of Nature finds that carcinogenic chemicals found in plastic products can leach into tap water, which may cause developmental, reproductive, neurological, and immune disorders. Some animal studies have raised similar concerns about endocrine-disrupting effects.

Microplastics have been found in human blood and placentas and in food and drinks, including tap water, beer, and salt. Several chemicals used in the production of plastic materials are known to be carcinogenic and can cause developmental, reproductive, neurological, and immune disorders. Discarded improperly, plastic waste pollutes and harms the environment, becoming a widespread driver of biodiversity loss and ecosystem degradation. It threatens human health, affects food and water safety, burdens economic activities, and contributes to climate change.

Marine wildlife impacts

Marine wildlife suffers the most direct and damaging effects of ocean plastic pollution. From all kinds of fish to turtles, seals, crustaceans, micro-organisms and many other forms of life, the damage caused by plastic pollution to marine animals is increasingly visible as we learn more about this problem. One of plastic's biggest assets as a material is its durability. However, this means that once plastic enters the ocean, it will persist there for long periods; it won't go away by itself.

Impacts on species and ecosystems

All land, freshwater, and marine ecosystems are affected by plastic pollution. Natural ecosystems provide a broad range of services that are not only fundamental for conservation, but also key for economies and human well-being. For example, healthy mangroves provide coastal protection services, whereas wetlands are important for freshwater provision. The most visible impacts of plastic debris are the ingestion, suffocation, and entanglement of species. Wildlife such as birds, whales, fish, and turtles mistake indigestible plastic waste for food and die of starvation as their stomachs become filled with it. It also causes internal and external injuries that reduce the ability to swim and fly. Domesticated farm animals are also affected by plastic pollution. Floating plastics transport invasive alien species, one of the leading causes of biodiversity loss and species extinction. Plastic pollution can also seep carcinogenic chemicals (such as those contained in certain plastic products or fireproofing coatings) into the soil. These can run into groundwater or rivers, affecting exposed people and ecosystems.

Any marine ecosystem is finely balanced, and any change to that balance can seriously impact the inhabitants. Floating plastic debris can allow species such as coastal organisms to spread far from their usual environments and thrive in the open ocean upsetting the balance in the GPGP. This can be damaging to marine life naturally occurring in ocean garbage patches, such as neuston. Some plastic not only contains harmful additives and chemicals but also acts as magnets for toxins from the surrounding air or water, so the longer a piece of plastic is out there, the more harmful it can become to any animal that ingests it.

Economic impacts

The build-up of plastic litter can have a negative impact on aspects of a country's economy and trade systems, with income declines in sectors such as small- and medium-enterprises, the informal sector, tourism, fisheries, agriculture, and water safety. IUCN's research on these economic impacts demonstrates examples and possible solutions.

Impacts on climate

Climate impacts begin with oil and gas extraction, the refining of these products into plastics, and then plastic pollution itself. Incinerated plastic waste releases greenhouse gases and other pollutants into the atmosphere, including carbon dioxide, dioxins, and methane. Plastic is a synthetic, organic polymer made from fossil fuels, such as gas and petroleum. Over 460 million metric tons of plastic are produced every year, according to the United Nations Environment Programme. Plastic is used in almost all consumer and industrial activities, from construction and vehicles to electronics and agriculture.

SOLUTIONS TO THE PLASTIC WASTE PROBLEM

The plastic waste problem is a global issue and requires global action. There are various ways the issues surround plastic waste can be tackled. Generally, they can be divided into four main categories: developing sustainable alternatives; reducing plastic usage; recycling plastic waste; implementing laws and regulations. One way of dealing with the plastic waste problem is to focus on sustainability and develop eco-friendly alternatives to plastic. This can be done in various ways and many companies have made strides in this area. Plastic has frequently been used as a material of convenience and in some cases alternative materials could not perform as well as its plastic counterparts or were simply cheaper to produce and therefore increased profit margins. However, with modern materials and processes this is not strictly the case any more.



Microplastics in the environment and food can cause many negative impacts on human health and the living environment

Moving away from plastic made with carbon polymers is something that has been tackled by a number of material manufacturers. There has been a lot of progress with the development of biodegradable materials, that can be used as plastic alternatives such as paper, bamboo, and corn starch. These materials are generally more eco-friendly, but historically have come at an increased cost. For some businesses the switch to different materials is less problematic but is still something that needs to be factored into production and sales costs. Legislation and taxes aside, finding alternative materials to use instead of continuing to focus on the production of plastic helps with one of the key elements of successfully tackling the plastic problem which is reducing plastic usage in the first place.

Reducing plastic usage

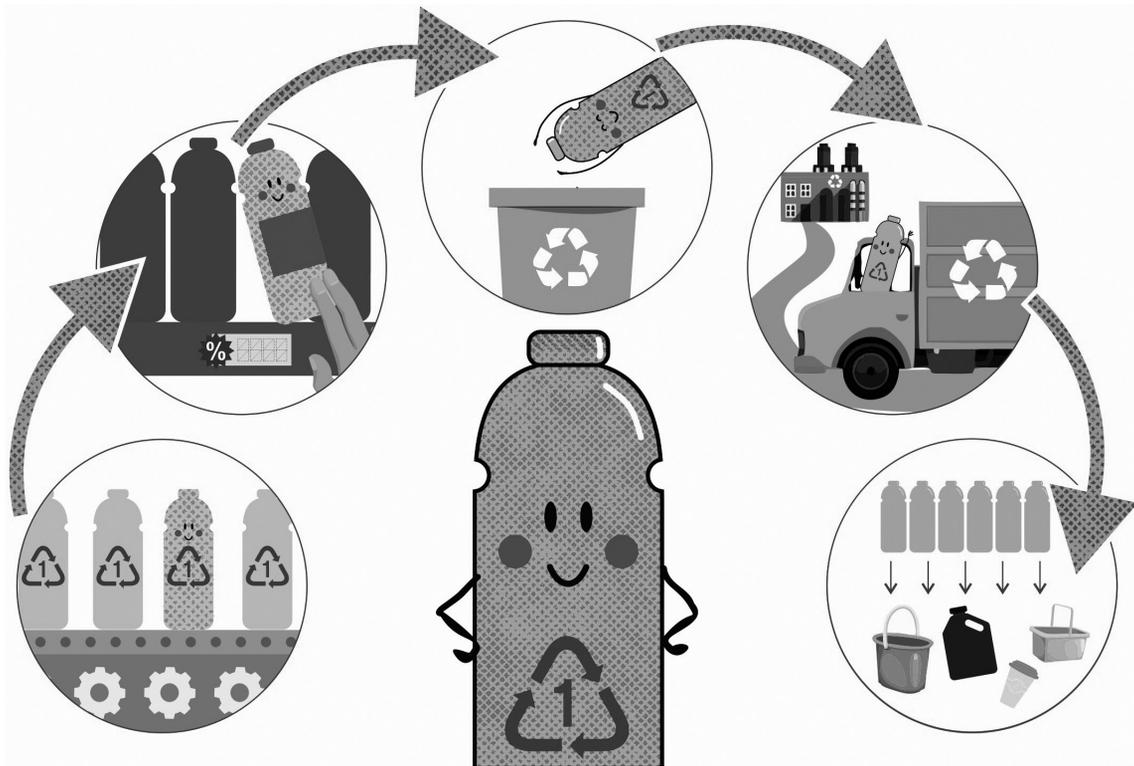
When it comes to materials and packaging in general, for some product types the material used in its production may not be as sustainable as you might imagine. One example is single use drink containers. The manufacturer of aluminium cans, glass bottles and plastic bottles all have a cost on the environment. Switching from plastic to one of the other materials may have some environmental benefits (plastic being a potential pollutant) but the real gains are found in terms of the products recyclability and the ability to recycle the material in the first place. Since in many locations all rubbish will end up being disposed of

together and is not recycled at all, any material will likely have some negative environmental impact, especially if its primary purpose is single use only. This is why there have been incentives such as attempting to remove single use packaging at the point of sale. Reuse schemes can have a lot of positives but there also needs to be a consumer mind-shift away from convenience to pro-active engagement in plastic avoidance. Ultimately, the goal is an overall waste generation reduction which will tackle all forms of excessive manufacturing and not just virgin plastic.

This can be done by using reusable products, such as reusable bags and bottles, and by avoiding single-use plastics, such as straws and disposable plates. Ultimately, the goal being the reduction of single-use items which will reduce the need to manufacture the item in the first place. Since single-use items are often made of plastic by moving to reusable containers it will help reduce the tons of plastic waste that enter the supply chain. These changes to the way a business operates can also save the business money once there has been a change in the mentality of the consumer away from convenience to conscientiousness.

Improved recycling

Improved recycling is another way to reduce plastic pollution. By recycling plastic waste, it can often be reused and repurposed into new products, which reduces the amount of plastic waste in the



When consumers switch to recycled products, it will reduce tons of plastic waste in the environment and help businesses save costs

environment. Recycling plastic comes with its own issues. While pretty much all plastic can technically be recycled, it is often not always practical or cost-effective to do so for every plastic type. Depending on where a person lives can have a big impact on what particular plastic types can or cannot be recycled. Improving waste management systems where people need them most will help tackle the problem of plastics and other materials not being effectively recycled. Improving the circular economy of the lifecycle of global plastics is paramount to helping the environment.

Implementing laws and regulations

As we have already touched on, governments have needed to address the plastic problem through increased legislation and dictates on what materials can be used for certain product types, typically revolving around single-use items. These laws and regulations have been introduced to help reduce the amount of plastic waste that is being created. This includes banning single-use plastics, such as straws and bags, and implementing taxes and fines on plastic products.

Many countries have already started to do this but there is no global mandate for this. Any initiative that currently implemented is on a country by country basis and therefore the effectiveness of these legislations

tend to be limited. When legislations and laws can be an effective way to reduce plastic pollution, these rules need to be in place in the first place, and not every country is committed to the same degree.

A circular economy for plastics offers a sustainable path forward. This means we need to rethink how we design, make, use and reuse plastics. Products must be designed to be used more than once, and to be recycled at the end of their life. This shift must include all stakeholders across the plastics value chain. A just transition is crucial to protect the livelihoods of waste pickers and impacted communities, ensuring social equity and leaving no one behind. The removal of legacy plastics and prevention of pollution requires that fewer plastic products be made, that the circularity of supply and value chains be increased, and that consumer behaviour be changed. It also involves public and private investment and the development of infrastructure along the full lifecycle of plastics, including circular economy solutions like reuse, refill, etc■

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