**A World of Plastic**

**WHAT IS PLASTIC?**

* Plastic is a material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and can be moulded into solid objects. Plastics are materials that can easily change its shape. Many things are made out of plastic, usually because making them the right shape is easy. Most of the materials that are called plastic are polymers, which are long chains of atoms bonded to each other.
* Plastics are derived from materials found in nature, such as natural gas, oil, coal, plants, and minerals. The very first plastics were made by nature -- did you know that rubber from a rubber tree is actually a plastic? Some plastics are occur in nature, like tree rubber. There are ‘organic’ plastics, which contain carbon, and there are ‘inorganic’ plastics which don’t contain carbon.
* Plastic is an essential component of many items, including water bottles, combs, and beverage containers. Knowing the difference, as well as the SPI codes will help you make more informed decisions about recycling.
* Some plastics are hard and shatter-resistant, others are soft and flexible. Plastics make various things that people don’t recognize as plastics at all, such as paints, glues, and insulations. Some plastics have additives that make them bacteria or fire resistant; or give them a rainbow of colours; or make them flexible; or fill them with bubbles to make them better insulators; or even add fibers to make high-tech composites. There are tens of thousands -- or more -- of different kinds of plastics and formulations.
* Plastics are used to make bicycle helmets, child safety seats, and airbags in automobiles. They’re in cell phones, televisions, computers, and other electronic equipment that makes modern life possible. They’re in the roofs, walls, flooring and insulation that make homes and buildings energy efficient.
* Plastic is a valuable resource in many ways, but plastic pollution is an unnecessary and unsustainable waste of that resource.

**TYPES OF PLASTICS**

* If you take a walk through your school, house or office you’re guaranteed to stumble across a variety of plastic products. No material is more commonly used in our everyday lives. It’s easy to classify everything as simple ‘plastic’, however, there are seven different types you should know about.

1. **Polyethylene Terephthalate (PETE or PET)** Introduced by J. Rex Whinfield and James T. Dickson in 1940, this plastic is one of the most commonly used on the planet. Interestingly enough, it took another 30 years before it was used for crystal-clear beverage bottles, such as the ones produced by Coca-Cola and Pepsi. PETE plastics make up 96% of all plastic bottles and containers in the United States, yet only 25% of these products are recycled. By being mindful and making sure to recycle code 1 plastics, you’re helping to ensure a cleaner environment and less landfill pollution!
2. **High-Density Polyethylene (HDPE)** In 1953, Karl Ziegler and Erhard Holzkamp used catalysts and low pressure to create high-density polyethylene. It was first used for pipes in storm sewers, drains, and culverts. Today, this plastic is used for a wide variety of products. HDPE is the most commonly recycled plastic because it will not break under exposure to extreme heat or cold. According to the EPA, 12% of all HDPE products created are recycled in a year. This is a very small dent in the planet’s carbon footprint.
3. **Polyvinyl Chloride (PVC)** PVC is one of the oldest synthetic materials in industrial production. It was actually discovered by accident twice; once in 1838 by French physicist Henri Victor Regnault and in 1872 by German chemist Eugen Baumann. On both occasions, these men found it inside vinyl chloride flasks left exposed to sunlight. PVC is one of the least recycled materials; generally less than 1% of PVC plastic is recycled each year. It has been called the “poison plastic”because it contains numerous toxins and is harmful to our health and the environment.
4. **Low-Density Polyethylene (LDPE)** LDPE was the first polyethylene to be produced, making it the grandfather of the material. It has less mass than HDPE, which is why it’s considered a separate material for recycling. Packaging and containers made from LDPE make up about 56% of all plastic waste, 75% of which comes from residential households. Fortunately, many recycling programs are evolving to handle these products. This means less LDPE will end up in landfills and negatively affect the environment!
5. **Polypropylene (PP)** J. Paul Hogan and Robert L. Banks of Phillips Petroleum Company discovered polypropylene in 1951. At the time, they were simply trying to convert propylene into gasoline, but instead discovered a new catalytic process for making plastic. Only about 3% of polypropylene products are recycled in the US, but interestingly enough, 325 million pounds of non-bottle plastics were collected for recycling over a year. In other words, a lot of this plastic is created, but only a small fraction is actually recycled.
6. **Polystyrene or Styrofoam (PS)** In 1839, German apothecary Eduard Simon accidentally came across polystyrene while preparing medication. He isolated a substance from natural resin and didn’t realise what he had discovered. It took German chemist Hermann Staudinger to research this polymer and expand on its uses.Since polystyrene is lightweight and easy to form into plastic materials, it also breaks effortlessly, making it more harmful to the environment. Beaches all over the world are littered with pieces of polystyrene, endangering the health of marine animals. Polystyrene accounts for about 35% of US landfill materials.
7. **Miscellaneous Plastics** The remaining plastics include: polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon. Of course, there are many differences in the plastics classified as miscellaneous by recycling programs. Many BPA products fall into this category, which means it's best to avoid them, especially for food products. It is not very easy to break down these plastics once they are created, unless they are exposed to high temperatures. This means they are nearly impossible to recycle.

**PROS AND CONS OF PLASTICS:**

**PLASTIC FANTASTIC:**

* The benefits of plastics are unmatched by any other material. It is light, easily shaped, strong, and inexpensive. Its ability to guard against contamination makes it useful in sterile medical environments such as hospitals.
* Plastic is light, inexpensive, and easily shaped.
* Plastic kitchenware offers a practical alternative to glass and ceramic dishes. Plastic preserves flavour and freshness when used to store food and beverages.
* Leak-proof and child-resistant plastic containers are useful for holding dangerous household products such as bleach, ammonia, and other caustic cleaners.
* Plastic packaging withstands the rigors of shipping, and plastic containers provide good storage solutions at school, home, and in the office.
* It seems that the benefits of using plastic are boundless -- but are they really?

**PROBLEMS WITH PLASTIC:**

* Plastic is loading up the planet with toxic chemicals and we’re only beginning to understand the serious consequences these substances have on health.
* The chemicals from plastic are building up in our bodies and in our environment.
* Plastic upsets the food chain. It comes in large and small sizes, and polluting plastics even affect the world’s tiniest organisms such as plankton.
* Groundwater pollution: Water conservation is already a concern in places ranging from California to parts of India, but the world’s water is in great danger because of leaking plastics.
* Land pollution: When plastic is dumped in landfills, it interacts with water and forms hazardous chemicals. When these chemicals seep underground, they degrade the water quality.

**WHAT YOUR COMMON HOUSEHOLD PLASTICS CAN BE RECYCLED INTO:**

* Household products: disposable utensils, meat packing

Type of plastic: polystyrene

Recycled into: CD cases, office accessories

* Household products: bottles, peanut butter jars

Type of plastic: polyethylene terephthalate (PET or PETE)

Recycled into: stuffing for pillows, carpet backing, and even certain types of sweatshirts

* Household products: shampoo bottles

Type of plastic: high-density polyethylene

Recycled into: other bottles, plastic lumber

* Household products: most bottle tops

Type of plastic: polypropylene

Recycled into: ice scrapers, industrial packing cases

* Household products: bags, grocery bags

Type of plastic: low-density polyethylene

Recycled into: plastic lumber and compost bins

**TIPS FOR CONSUMING LESS PLASTIC:**

* Make an effort to purchase products with minimal plastic packaging.
* Use cloth bags for grocery shopping.
* Reuse plastic containers within your home. For example: plastic grocery bags can be reused for additional trips to the grocery store, as lunch bags, gym bags and garbage can liners. Old margarine containers can become storage vessels for an assortment of household items.
* Familiarise yourself with plastic recycling in your community.
* Avoid using plastic straws and purchase a reusable stainless steel straw.
* Purchase food, like cereal, pasta and rice from bulk bins and full a reusable container or bag.
* Use a reusable bottle or mug for your beverages, even when ordering from a to-go shop.
* Use cloth diapers to reduce your baby’s carbon footprint and save money.
* Make fresh squeezed juice or eat fresh fruit instead of buying juice in plastic bottles. It’s healthier and better for the environment.

**Plastic Filling the Oceans:**

* Plastics reaching oceans directly threaten marine life and habitats, but ocean pollution also results in chemicals being released into the air. These chemicals are dangerous to humans as well as to marine species. The large amount of plastic entering waterways from coastal locations makes reducing ocean pollution especially important in these areas, but no matter where you live, you play a role in helping to address this global problem.

**THE WORLD’S PLASTIC POLLUTION CRISIS EXPLAINED:**

* Much of the planet is swimming in discarded plastic, which is harming animals and possibly human health. Can it be cleaned up?
* Plastic pollution has become one of the most pressing environmental issues, as rapidly increasing production of disposable plastic products overwhelms the world’s ability to deal with them. Plastic pollution is most visible in developing Asian and African nations, where garbage collection systems are often inefficient or nonexistent. But the developed world, especially in countries with low recycling rates, also has trouble properly collecting discarded plastics.

***How did this happen?***

* *Plastics made from fossil fuels are just over a century old.*
* Some key facts:
* Half of all plastics ever manufactured have been made in the last 15 years.
* Production increased from 2.3 million tonnes in 1950 to 448 million tons by 2015. Production is expected to double by 2050.
* Every year, about 8 million tons of plastic waste escapes into the oceans from coastal nations. That’s the equivalent of setting five garbage bags full of trash on every foot of coastline around the world.
* Plastics often contain additives making them stronger, more flexible, and durable. But many of these additives can extend the life of products if they become litter, with some estimates ranging to at least 400 years to break down.

**HOW PLASTIC MOVES AROUND THE WORLD:**

* Most of the plastic trash in the oceans flows from land. Trash is also carried to sea by major rivers, which pick up more and more trash as they move downstream. Once at sea, much of the plastic trash remains in coastal waters. But once caught up in ocean currents, it can be transported around the world.
* Microplastics: once at sea, sunlight, wind, and wave action break down plastic waste into small particles. These so-called microplastics are spread throughout the water column and have been found in every corner of the globe, from Mount Everest, the highest peak, to the Mariana Trench, the deepest trough. Microplastics are breaking down further into smaller and smaller pieces. Plastic microfibers, meanwhile, have been found in municipal drinking water systems and drifting through the air.

**HARM TO WILDLIFE:**

* Millions of animals are killed by plastics every year, from birds to fish to other marine organisms. Nearly 700 species, including endangered ones, are known to have been affected by plastics. Nearly every species of seabird eats plastics.
* Most animal deaths are caused by starvation due to lack of food and more garbage, or entanglement from the plastic that is thrown into the sea. Seals, whales, turtles, and other animals are strangled by abandoned fishing gear or discarded six-pack rings.
* Microplastics have been found in more than 100 aquatic species, including fish, shrimp, and mussels meant for our dinner plates. These tiny bits pass through the digestive system and are expelled without consequence. But plastics have also been found to have blocked digestive tracts or pierced organs, causing death. Stomachs that are packed with plastics reduce the urge to eat, causing starvation.
* Plastics have been consumed by land-based animals, including elephants, hyenas, zebras, tigers, camels, carrle, and other large mammals, in some cases causing death.
* Tests have also confirmed liver and cell damage and disruptions to reproductive systems, prompting some species, such as oysters, to produce fewer eggs.
* The solution is to prevent plastic waste from entering rivers and seas in the first place. This could be accomplished with improved waste management systems and recycling, between product design that takes into account the short life of disposable packaging, and reduction in manufacturing of unnecessary single-use plastics.

**WHAT IS PLASTIC POLLUTION?:**

* Plastic pollution is when plastic is gathered in an area and has begun to negatively impact the natural environment and create problems for plants, wildfire, and even the human population. Often this includes killing plant life and posing dangers to local animals. Plastic is an incredibly useful material, but it is also made from toxic compounds known to cause illness, and because it is meant for durability, it is not biodegradable.
* As the world’s population continues to grow, so does the amount of garbage that people produce. When you’re on-the-go running errands, going on trips, or packing school lunches, these lifestyles require easily disposable products, such as soda cans or bottles of water, but the accumulation of these products has led to increasing amounts of plastic pollution around the world.
* As plastic is composed of major toxic pollutants, it has the potential to cause significant harm to the environment in the form of air, water, and land pollution.
* When you go shopping, try to carry a paper or cloth bag with you instead of plastic bags. If you try to avoid using plastic bags you are contributing towards the environment in the form of reducing plastic pollution whose ill effects are irreversible.
* “I am concerned about the air we breathe and the water we drink. If overfishing continues, if pollution continues, many of these species will disappear off the face of the Earth” - Bernard Marcus

**WHY IS PLASTIC POLLUTION A PROBLEM?**

* Plastic takes a long time to decompose and can leach toxic chemicals in our soil and water, which can have an impact on human health. Wildlife can also get entangled in the plastic or if they mistake it for food they can choke or starve to death.
* One way to reduce plastic pollution is to stop using single-use plastics. You can find an alternative to many of the plastic items you use every day. Rather than disposable plastic water bottles, buy a reusable one. You could even buy a beverage in a sturdy glass container and reuse it.

**VARIOUS CAUSES OF PLASTIC POLLUTION?:**

* While solving the problem of plastic pollution may seem as easy as just implementing recycling or cleaning up empty bottles, the trust is that the plastic causing the pollution can range in size from big to small. The major contributors to this problem today include but are not limited to:

**Plain Old Trash**

~ Plastic is everywhere, even on those items you may not expect it to be. Milk cartons are lined with plastic, water bottles are handed out everywhere, and some products may even contain tiny plastic beads. Every time one of these items gets thrown away or washed down the sink, the toxic pollutants have more of a chance to enter the environment and do harm.

~ Trash dumps and landfills are unfortunate major problems, as they allow pollutants to enter the ground and affect wildlife and groundwater for years to come.

**It is Overused**

~ As plastic is less expensive, it is one of the most widely available and overused items in the world today. When disposed of, it does not decompose easily and pollutes the land or air nearby when burned in the open air.

**Fishing Nets**

~ Commercial fishing is an economic necessity for many parts of the world, and tons of people eat fish for their daily survival. However, this industry has helped contribute to the problem of plastic pollution in the oceans in several ways. The net used for certain large-scale trolling operations are usually made of plastic.

**Disposing of Plastic and Garbage**

~ Plastic is impossible to break down. Burning plastic is incredibly toxic, and can lead to harmful atmospheric conditions and deadly illness. Therefore, if it is in a landfill it will never stop releasing toxins in that area.

~ Even recycling doesn’t cut down on plastic, as it essentially uses the existing plastic. The process of recycling can also lead to plastic irritants being released in a number of ways.

**SERIOUS EFFECTS OF PLASTIC POLLUTION?:**

* **It Upsets the Food Chain:**  
  - Because it comes in sizes large and small, polluting plastics even affect the world’s tiniest organisms such as plankton. When these organisms become poisoned due to plastic ingestion, this causes problems for the larger animals that depend on them for food. This can cause a whole slew of problems, each step further along the food chain. Plus, it means that plastic is present in the fish that many people eat everyday.
* **Groundwater Pollution:**  
  - Water conservation is already a concern in places ranging from California to part of India, but the world’s water is in great danger because of leaking plastics and waste. If you’ve ever seen a garbage dump, imagine what happens every time it rains -- then imagine that being in your drinking water. Groundwater and reservoirs are susceptible to leaking environmental toxins.
* **Land Pollution:**   
  - When plastic is dumped in landfills, it interacts with water and forms hazardous chemicals. When these chemicals seep underground, they degrade the water quality. Wind carries and deposits plastic from one place to another, increasing the land litter. It can also get stuck on poles, traffic lights, trees, fences, towers, etc. and animals that may come in the vicinity and might suffocate them to death.
* **Air Pollution:**   
  - Burning of plastic in the open air, leads to environmental pollution due to the release of poisonous chemicals. The polluted air when inhaled by humans and animals affect their health and can cause respiratory problems.
* **It Kills Animals:**   
  - Despite countless TV ads over the years showing ducks and dolphins trapped in six-ring plastic can holders, these items are still used and incorrectly recycled everyday. Whether because the mass of plastic has displaced animals or the related toxins have poisoned them, plastic pollution does a lot of damage to the world’s ecosystems.
* **It is Poisonous:**

- Plastic is made by using a number of toxic chemicals. Therefore, the use of and exposure to plastics has been linked to a number of health concerns affecting people around the world. The processes of making, storing, disposing of, and just being around plastics can be extremely harmful to living things.

* **It is Expensive:**  
  - It costs millions of dollars each year to clean affected areas after exposure, not to mention the less of life to plants, animals, and people. As land becomes more valuable, just finding a place to put garbage is becoming a problem in many parts of the world.

**EFFECTIVE SOLUTIONS TO PLASTIC POLLUTION?:**

The reality is that the only way this problem can be addressed is by individuals and companies around the world agreeing to implement practices that reduce waste on every level. The top tips for reducing plastic waste are:

* **Shop friendly:**  
  - Plastic bags were once a modern convenience but can efficiently be replaced by reusable bags, many of which fold up compactly in order to be portable. Just think about how many bags you typically carry out of a grocery store, and multiply that by the number of times you grocery shop. That’s a lot of plastic! Carry a bag and always reuse plastic bags as much as possible if you have them.
* **Get Rid of Bottled Water:**  
  - People are meant to drink lots of water each day, and plastic water bottles have become a great way to stay hydrated throughout the day. However, most of these are only recommended for single use, and that means that every time someone finishes a bottle, it goes into the trash. Many companies now sell reusable water bottles as a substitute, reducing plastic waste and exposure to leaking bottles.
* **Forget to-go Containers:**  
  - You would be surprised at how much plastic is involved in the making and packaging of food containers. Think the coffee shop’s drink cup is paper? It’s likely lined with plastic for insulation. Pour a cup of coffee on some cardboard and see what happens.   
  - Plastic food containers, lids, and utensils are all easily replaced by reusable containers, which will cut down significantly even a single meal’s waste.
* **Recycle Everything:**   
  - Try and select the items that come in non-plastic recycled and recyclable packaging, to do your best to properly handle items that can’t be reused. Check everything before you put it into the trash, as more and more items are able to be recycled these days.   
  - Remember that because plastic doesn’t break down easily (if ever), recycling plastic means that it is still plastic, just being used for a different purpose. Therefore, you’re not actually reducing plastic amounts or exposure, even in the recycling process.

How does it get in the sea?

We know our oceans and coastlines are choking on plastic. We’ve all seen plastic bottles, food wrappers and plastic bags polluting beaches, and been horrified by the stories of marine creatures like seabirds and whales starving when their stomachs become packed full of plastic.

* While about a fifth of marine litter is made up of fishing gear and other materials lost at sea by accident, industrial losses, or illegal dumping, we know that roughly 80% of litter in the seas comes from land.
* New research shows that we’ve produced plastic as heavy as 1 billion elephants since the 1950s.
* Just 9% of this plastic has been recycled. That means the majority of plastic waste has simply been dumped in landfills or burned.

**THE PROBLEM WITH PLASTIC:**

* Many plastics contain a disease or a dangerous chemical that can leach out of the plastic material and can get into our food, water, and even into our bodies .
* Unfortunately ,only 9% of the plastic in every product gets recycled .
* There is too much plastic in the system.
* Producers are bear ultimate responsibility for plastic pollution.
* not all plastic is created equal.
* Producers are bear ultimate responsibility for plastic pollution.
* Solutions exist, and groups around the world are fighting for and implementing them.

**FACTS ABOUT PLASTIC**

* Around the world, one million plastic drinking bottles are purchased every minute, while up to 5 trillion single-use plastic bags are used worldwide every year.
* Researchers estimate that more than 8.3 billion tonnes of plastic has been produced since the early 1950s. About 60% of that plastic has ended up in either a landfill or the natural environment.
* Rivers carry plastic waste from deep island to the sea.
* Every day approximately 8 million pieces of plastic pollution find their way into our oceans.
* Plastic pollution can now be found on every beach in the world, from busy tourist beaches to uninhabited, tropical islands nowhere is safe.
* 100,000 marine mammals and turtles and 1 million seabirds are killed by marine plastic pollution annually.
* only 9% of it has been recycled.
* In some parts of the world, using plastic is already illegal.
* 73% of beach litter worldwide is plastic.
* A million plastic bottles are bought around the world every minute.
* Worldwide, about 2 million plastic bags are used every minute.
* 90% of plastic polluting our oceans is carried by just 10 rivers.
* Every half second, 1 plastic garbage bag goes into the world's ocean!
* There is more microplastic in the ocean than there are stars in the Milky Way.
* 100 kilograms (220 pounds) of plastic each year
* We eat, drink, breath 70,000 plastic bits a year
* There may now be around 5.25 trillion macro and microplastic pieces floating in the open ocean

<https://www.conserve-energy-future.com/causes-effects-solutions-of-plastic-pollution.php>

Complete Recycling LLC, “Plastic Recycling and Resin Identification Codes”

Scranton Products, “Different Types of Plastic and SPI Codes Used to Classify Them”

Miller, Clay, Ways 2 Go Green, “Plastic Recycling & Plastic Identification Codes”

Earth Easy, “Plastic by the Numbers”

Willis, Amanda, Earth 911, “The Ultimate Plastic Breakdown”

Scharping, Nathaniel, Discover Magazine, “Here’s How Much Plastic Humanity Has Produced”

Thought Co., “Recycling Different Plastics”

West, Larry, Thought Co., “Why Recycle Plastics?”

Encyclopedia Britannica, “Polyethylene Terephthalate”

Gabriel, H. Lester, Plastic Pipe Institute, “History and Physical Chemistry of HDPE”

PVC, “The History of PVC;” Plastics Make it Possible, “A Professor Plastics Feature Article”

American Chemical Society, “Discovery of Polypropylene and the Development of a New High-Density Polyethylene”

Bellis, Mary, The Inventors, “Polystyrene and Styrofoam”

D’Alessandro, Nicole, Eco Watch, “22 Facts About Plastic Pollution (And 10 Things We Can Do About It)”

Fact Republic, “35 Interesting Facts about Plastics”

Danehy, J. (2016, March 29). Science Made Simple: How Plastic is Turned into Polyester. Retrieved from <https://www.fairharborclothing.com/blogs/news/science-made-simple-how-plastic-is-turned-into-polyester>

What Plastics Can Become. (n.d.). Retrieved from [https://www.recycleandrecoverplastics.org/consumers/kids-recy](https://www.recycleandrecoverplastics.org/consumers/kids-recycling/plastics-can-become/)cle

<https://storyofstuff.org/the-story-of-plastic/the-problem-with-plastic/>

<https://www.qualitylogoproducts.com/promo-university/different-types-of-plastic.htm>

<https://www.alive.com/lifestyle/plastic-pros-and-cons/>

****