

Opinion: The Effects of Plastic Pollution on the Environment Post-Coronavirus Pandemic from a Freshman Chemistry Student's Perspective

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Abstract In one of my applied chemistry classes, the students were given the opportunity to write about an environmental issue from their perspective. One of the topics the students picked was plastic pollution. In recent years, there has been a 200-fold increase in plastic production compared to 1950. Plastic is popular because it is cheap, lightweight, nonreactive, and waterproof. However, it is a real problem for the environment. For example, ocean plastic pollution is very harmful to wildlife and human. Since the coronavirus pandemic broke out in the year 2020, plastic pollution has become even worse due to the excessive use of masks, gloves, and gowns in hospitals and by regular citizens. It is also extensively used in water bottles and soft drinks as people were discouraged from using public water fountains. With plastic pollution set to quadruple by the year 2050 (plastic pollution coalition), the world is in extreme danger. We suggest that Legislative action from governments around the globe could overturn this serious environmental global problem. Additionally, the use of more biodegradable alternatives as well as raising society's awareness of the problem should be encouraged.

Keywords Plastic pollution, Educating society, Students' awareness of environmental issues, Masks and gloves, Water bottles, Legislative Action

1. Introduction

Since the beginning of time, humans have revolutionized the world in ways that were thought as impossible. Inventors and innovators have made what the world is today. However, when looking at everything around us, almost everything is a pollutant. For instance, plastic water bottles, the burning of fuels in the air, and pesticides put on plants, are some of the many ways pollution affects the earth. While cars, packaging, and preservatives have improved the world's access to an easier and accommodating environment, humans seem to dismiss the harmful effects of the effortless way of living. One of the biggest issues on our planet is the massive tons of waste, specifically plastic. Plastic pollution is detrimental to the environment, wildlife, and climate; therefore, it must end. People do not realize just how much the plastic bottles they are drinking out of can impact their health as well. According to the Plastic Pollution Coalition, plastic has been found in human blood and placental tissue. Not only does it affect human health, but it also affects the daily living of humans. If our world continues to have vast amounts of plastic waste, it will soon fill the yards and

walkways that we access every day. As stated by Richie, Hannah (2018). "In 1950 the world produced only 2 million tonnes per year. Since then, annual production has increased nearly 200-fold, reaching 381 million tonnes in 2015. For context, this is roughly equivalent to the mass of two-thirds of the world population." It is shocking how much plastic we continue to use, even though we see the hazardous effects it has. It is time to take action in communities and at the legislative level, in order to prevent the earth from continually declining.

2. Finding Solutions

In almost every place you look, you can see plastic. Plastic is used on almost everything, whether it be a water bottle, a package of chips, or toys. In today's society, plastic is mostly used for convenience. It is much easier to have snacks or products on the go rather than buying things in bulk and having to package them yourself. The use of plastic promotes laziness and a toxic unclean society for the satisfaction of wants, not needs. According to the center of biological diversity, plastic makes up approximately 40 percent of the ocean's surfaces. It is absurd that our planet is filled with plastic that animals choke on every day. Not only is plastic harmful for animals, but it is harmful to humans as well. As provided by the Plastic Pollution Coalition, approximately every 30 seconds, a human dies

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from diseases caused by plastic waste. Convenience should never surpass the health of humans and animals. Ultimately, in order to stop the plastic pollution pandemic for good, government control must act. Through education and laws, pollution can be overturned. Unfortunately, we live in a society where change is not possible unless fear is instilled. If laws against littering were taken more seriously, plastic pollution would be feared by humans. Most producers of our products use plastic because “it is a unique material: often lightweight, resilient, usually nonreactive, waterproof and cheap. For most of us, it has an almost constant place in our lives. Even those who try to minimize or cut plastic from their lives are likely to come into contact with it every day,” Richie, Hannah (2018). Because we live in an economy where cost-effectiveness trumps health hazards, it is easy for these companies to get away with the harmful products they make. Creating laws where manufacturers can only use a small amount of plastic in their products would help contain the mass production of plastic products. If we start with manufacturers, which are where these products come from, and then bring laws against society's littering and pollution, plastic pollution could be resolved. However, there still continues to be zero legislative action from our government to overturn this pandemic. With plastic pollution set to quadruple by the year 2050 (plastic pollution coalition), the world is in extreme danger. Please see figure 1 for the 2040 and 2050 expected annual plastic production [2,4].

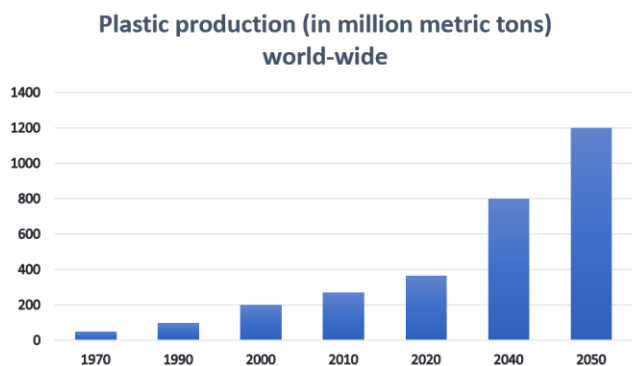


Figure 1. Annual plastic production is expected to quadruple by the year 2050, source references [2,4]

Since the coronavirus pandemic broke out in the year 2020, plastic pollution has become even worse. On top of the already hazardous numbers of plastic, the coronavirus only created more damage. Every day we see masks all over the ground. This has become a normal thing to see in the past couple of years. However, the masks are not the only thing the coronavirus has caused with the increase in pollution. In every hospital throughout the world, employees are using an excessive number of masks, gloves, and gowns, to prevent the spread of the coronavirus. When you add a worldwide health pandemic to a mass plastic pollution pandemic, the odds seem completely against us, in resolving the plastic pollution issue. Even though these materials are necessary for the virus pandemic, companies

could create more degradable and recyclable products that could be used. Please see figure 2 for the differences between conventional and biodegradable plastic [6].

	Conventional plastic	Bioplastic
Origin	Hydrocarbons polymers such as Polyethylene (PE), Polyvinyl chloride (PVC), Polyethylene terephthalate (PET), Polystyrene (PS), Polyurethane (PU)	Agricultural, Food, Paper waste, Feathers, and others such as Cellulose, starch, lipid, chitin, and protein-based bioplastics; Polylactic Acid (PLA), Polyhydroxyalkanoates (PHA), Polyhydroxybutyrate (PHB) polymers
Annual production	300 million metric tons	4 million metric tons
Toxicity	Bisphenol A (BPA), a hormone disrupter that is often found in traditional plastics and is also eco-toxic	less toxic
Production cost	Cheaper	More costly
Energy	More Energy is needed to produce	Less energy is needed to make
Effect on the environment	Increases in global warming led to abiotic depletion, reduce soil fertility, affect wildlife, and contribute to ocean pollution.	Mostly eco-friendly, no harm to abiotic factors, increases soil fertility

Figure 2. Conventional vs Bioplastic. Bioplastic is more eco-friendly and requires less energy to make. However, it is more expensive to make [6]

Every day we create habits that affect the world more than we think they do. While drinking out of a soda can, we tend to not think of the consequences, such as it is ending up in the oceans and rivers where humans swim and animals live. The simple soda can we drink out of could end up causing the death of another species or even humans. We hear in the news frequently about animals becoming extinct, but we never seem to question why. The reason is that we have destroyed animals' habitats with pollution and man-made materials. “Endangered wildlife like Hawaiian monk seals and Pacific loggerhead sea turtles are among nearly 700 species that eat and get caught in plastic litter” according to the Center for Biological Diversity. While choosing to use these harmful products, we should more often question why it is right for animals and our own species to suffer for our own convenience. Even though we live in a society where life is busy and the products being made are easier and more suitable for our wants, it does not dismiss the fact that our actions are those that are sacrificing our planet and other species for our own sympathy.

In order to make a significant impact, the government could promote biodegradable products to companies. If the public were aware of the benefits of cleaner products, less pollution would occur. Because the government has a lot of power over the people, it is important that they put laws and policies in place, as well as openly make the hazards of plastic on the environment known. A straightforward way to reach a large crowd is through social media. If the government used the media to help promote and educate about the unsafe environment that we have caused, it could create a mass change in how our society views the choices we make. It is time to take control of our world again. The Center for Biological Diversity has petitioned the Environmental Protection Agency to begin regulating plastics as a pollutant and is working tirelessly to end plastic pollution at its roots before it continues to get worse. However, it should not have to be put on these organizations in order to prevent plastic pollution; it should be the governments. Overall, if plastic pollution is not

controlled globally, it will only continue to get worse.



Figure 3. Since the coronavirus pandemic broke out, plastic pollution has become even worse. Legislative action, more biodegradable alternatives as well as raising society's awareness of the problem should be encouraged.

Although most people continue their selfish lifestyles of littering and polluting, there are several worldwide groups that dedicate their time to cleaning up our world. The Plastic Pollution Coalition and The Center for Biological Diversity are among the several groups that have taken action to make our world a cleaner and safer place. It is also important that communities get involved to stop littering and promote reducing, reusing, and recycling. However, unfortunately even the smallest ways people can participate in improving the environment is just not enough to control the issue permanently. Joining groups like the plastic pollution coalition can help broaden the ways we can reduce the use of plastic. There are many ways to get involved in online groups, whether it be through actively participating in petitions, or travelling to places to clean up that area. However, the biggest change we can make individually is to educate those around us on the harmful effects of plastic and teach ways to get involved, as well as clean products to use instead. The biggest issue involving actively cleaning up the environment is that the government is not involved, therefore not enough people are making a difference to stop pollution from occurring. Overall, laws for littering and polluting must be mandated and held as an actual crime. If it is not taken seriously, nothing will ever change.

Ultimately, educating society on the dangers of plastic pollution, creating laws, and enforcing the production of cleaner products, could solve the issue of global mass plastic pollution. There are so many ways to get involved through your community, such as cleaning up rivers, lakes, or streams, buying plastic-less products, and reusing and recycling any plastic you may use. Although getting involved in your community can make a difference, the difference is unfortunately exceedingly small. As mentioned by the Center for Biological Diversity, although

communities and organizations are involved, every year, there are still billions of pounds of even more plastic that wind up in the world's oceans. The Center for Biological Diversity estimates that 15 to 51 trillion pieces of plastic are in the world's oceans as well as there is not a single square mile of any of the oceans on the earth that are not covered in plastic. The numbers are appalling when researching just how much plastic pollution there is. Therefore, it is crucial that the government and worldwide organizations get involved to create global resolutions as well.

3. Conclusions

By educating society on the use of clean products such as recycled materials, wood, and paper, plastic pollution could be drastically reduced or even eliminated. It is extremely important to hold ourselves and others accountable for the choices in products we make, as well as how we dispose of them. Educating those around us will help promote a safer and cleaner society. If the government were to ban or control the use of plastic in products, manufacturers are then held responsible for what they produce. Although some may brush off the realism of what plastic is doing to the world, because it is just a new way of living, it is vital to hold those people responsible for their carelessness of our harmed environment. Even though there are many ways to make the world a better place, banishing the use of plastic is a great start in making a new cleaner world.

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