Turning the Tide on Plastic Waste: Interdisciplinary Solutions from the Applied Humanities

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INTRODUCTION

Plastic pollution over the past few decades has accumulated and is only expected to increase in the future. The pollution is causing significant damage to both terrestrial and marine ecosystems, resulting in increased contamination of both land and air. Scientists are deeply concerned about the unknown dangers that plastic poses to both human and environmental health. Compounding this problem is the fact that such methods are currently lacking, leading to a build-up of plastic waste that threatens our ecosystems and raises serious concerns about the health impacts on both humans and the environment. Recycling has long been thought of as a saving grace. Yet, with huge questions about the effectiveness and scalability of recycling, recycling is better seen as a piece of the puzzle, a highly important piece that should be enlarged, but not a cure-all. The traditional, highly optimistic view of the role of recycling, which presents recycling as the ultimate solution, is based on the development of technologies that do not necessarily exist yet. However, in the meantime, it has become increasingly clear that the traditional view of recycling as a cure-all is not realistic. This disconnect between reality and mainstream thought has created an environment where young people are not particularly interested in engaging with the complex reality of plastic recycling. Instead, they cling to the simplistic view that has been perpetuated.

Our paper examines three major obstacles in the way of analyzing and ameliorating the plastic problem- policy, logistics, and culture. It also looks deeper into how young adults relate to this problem and how they have contributed to and can help solve this crisis. In the end, the paper lays out recommendations to increase recycling rates among young people, and support infrastructure to enable recycling to be more effective and scalable. Recommendations are organized into three categories: policy, action, and education.

SECTION ONE - How We Got Here

I. Logistics

Plastic usage skyrocketed during World War II due to the increased demand for plastic products. Investments in research and development also increased during this period. In just six years, plastic production nearly quadrupled and in the United States alone, it increased by 300% (Freinkel, 2011). Increased production was largely driven by the specialized nature of plastic products needed for military purposes. These plastics can be modified to have a variety of characteristics that are suitable for different purposes or environments.

The production of plastics involves a combination of two chemicals, ethane and propane, which can be obtained from various sources, with oil and natural gas being the most common. The two chemicals are subjected to extremely high temperatures, and then mixed with a catalyst and other additives, which gives rise to the various properties of plastics. The resulting mixture is then cooled and transformed into small pellets. These pellets are melted and molded into the vast array of plastic products that are ubiquitous in our daily lives.

New technologies and massive investments in plastic manufacturing infrastructure created a production base that significantly exceeded pre-war times. Following the war, plastic

manufacturers quickly realized the potential uses of plastics for households. Furthermore, the economies of scale developed during wartime lended themselves to reducing costs. As the 20th century progressed, plastic technologies became wildly successful in terms of sales yet lagged in creating a system or culture of sustainable plastic disposal.

In the 1970s, as environmental concerns gained national attention, recycling became an American initiative. However, plastic manufacturers, oil companies, and chemical companies were more interested in continuing to increase plastic consumption and avoiding regulation than in finding sustainable solutions. To do this, they created advertising campaigns and lobbying groups such as Keep America Beautiful, which produced famous ads like "The Crying Indian" and the well-recognized Mobius loop. This was a part of a larger initiative to shift responsibility onto end consumers despite producers recognizing that this was not a sufficient solution. “The proliferation of single-use containers and the development of harder impossible-to-recycle materials were profit-seeking industry developments, and not the result of consumer demands... Each deposit-type bottle displaced from the market means the sale of 20 one-way containers (Center for Environmental Law. 2017).” By shifting the responsibility to consumers, plastic companies were more able to market, sell, and thus produce single use plastics without pushback from consumers and environmentalists.

This led to a second explosion in plastic usage and creation, plastic production rose from 16.5 million tons in 1964 to 343 million tons in 2014 (Cho, 2014). This increase has largely come in the form of product packaging, which currently accounts for over a third of plastic production, as seen in Figure 1 (Figure 1 displays the sectors of plastic production and what percentage of the total they make up). Furthermore, the preeminence of single use containers, bags and product packaging creates more convenience in the lives of consumers. This added convenience is difficult to remove without being viewed as an attack on consumers-as can be seen in pushback against plastic straw bans or plastic bag bans or taxes.

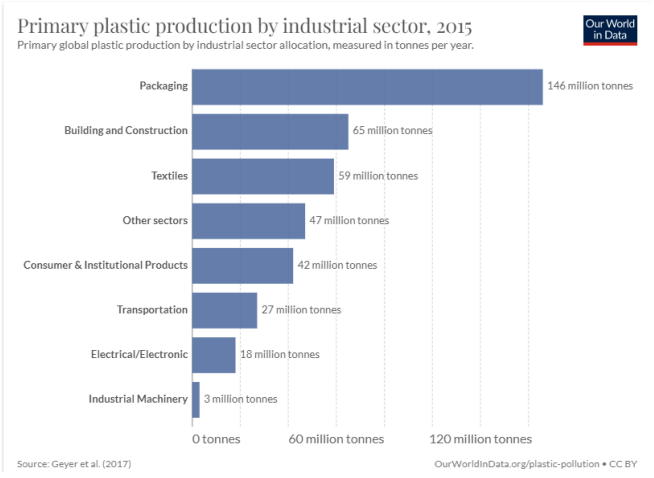

FIGURE 1

When not properly disposed of, plastics can decompose into microplastic. Microplastics are small pieces of plastic that are less than 5 millimeters in size. These particles can be harmful to people in several ways. For example, microplastics can be ingested when they are present in

drinking water or the food we eat. Once inside the body, they can release chemicals that can harm our health, including endocrine disruptors that can interfere with our hormones. In addition, microplastics can act as a vector for other harmful substances, such as bacteria and viruses, which can be transmitted to people when they come into contact with microplastics. Furthermore, microplastics can be inhaled when they are present in the air, which can damage the respiratory system and cause other health problems. Overall, the health impacts of microplastics are not fully understood, but they are a cause for concern, and further research is needed to understand better the risks they pose to human health.

The vast majority of plastics materials have made their way into landfills. Currently, it is estimated that 4.9 billion metric tons of plastic materials have made their way into landfills. And that number is expected to double by 2050. That accounts for nearly 80% of all total plastic produced. (Geyer et al, 2017). Because plastic requires sunlight to be broken down, plastic in landfills typically remain there for extensive periods of time. The other remaining option is incineration. Plastics can be turned into energy and ash, at WTE (Waste to Energy) sites. Plastics and other waste materials are burned at temperatures upwards of 2,000°F with the vast majority of harmful pollutants captured and dealt with safely. However, questions remain about exactly how clean and safe this process is and just how much of the dangerous pollutants are captured (Verma et al, 2016). Burning plastic can also generate energy, however it generates, on average,3-5 times less than can be reclaimed through recycling (Geyer et al, 2017).

Recycling is often touted as a solution to plastic pollution, but in reality, it is only a small part of the solution to plastic waste-the largest piece being reduction of demand and consumption. The process of recycling involves collecting, sorting, cleaning, and melting down plastic waste into pellets that can be used to produce new plastic products. However, there are several limitations to recycling that prevent it from being a sustainable solution to plastic pollution.

Firstly, not all plastic products can be recycled with present technologies. Some plastics are not recyclable due to their chemical composition being difficult to revert, others are too contaminated with organic waste. This means that a significant amount of plastic waste ends up in landfills, burned, or in our natural habitats where it can persist for hundreds of years. Secondly, recycling requires significant investment in infrastructure and technology, which is often lacking in many communities around the world. As a result, even where plastic waste is collected for recycling, it may not be processed effectively, leading to further plastic pollution. Additionally, the process of recycling is energy-intensive which often means increased greenhouse gas emissions. Therefore while recycling may reduce the amount of plastic waste, it may not necessarily reduce the environmental impact of plastic production and use. Lastly, recycling also relies on a consistent supply of high-quality recyclable plastic waste. This is often not available, as many people do not properly sort their waste, or the quality of the waste is too poor to be recycled. Furthermore, the contamination of only a few pieces of plastic can contaminate an entire batch of otherwise recyclable materials. This means that even where recycling infrastructure exists, it may not be used effectively.

A potential solution to the growing plastic disposal problem was to sell it to other countries. China, being the largest manufacturing base in the world, had a high demand for recycled pellets. Recycled plastics are versatile and can be used for a wide range of products, including PET bottles and polyester fabrics. These raw materials were seen as a potential benefit to Chinese manufactures. However, under increasing pressure to deal with ecological and pollution problems, China halted the import of recyclables. Moreover, China's access to low-cost labor helped to alleviate one of the major challenges in the recycling industry, namely the requirement for inexpensive, unskilled labor. A topic discussed in more detail later in this section.

Prior to 2017, China was the destination for 70% of the world's plastic waste. This included most of the United States' plastic waste. Instead of building up infrastructure and systems for dealing with plastic accumulation, many developed nations, including the US, sent its plastic waste to China. This created a significant dependency on China for plastic disposal. For years, the US did not have to deal with the issues of plastic waste management because all the waste was shipped to China. As a result, recycling and other forms of plastic waste management have not advanced in the US and other nations as much as necessary due to this reliance and subsequent lack of investment in infrastructure and research.

However, at the end of 2017, China instituted a policy of not accepting waste from foreign nations. This left thousands of tons of plastic waste on barges with nowhere to go, and plastic accumulation was not set to stop nor slow down. Since then, the US has been forced to face the lack of economical and environmentally friendly plastic waste management options, leaving them unprepared to deal with the situation.

II. Policy/Law

When it comes to plastic recycling, the city of Davie, Florida changed its policy on recycling in 2021. In 2021, they changed the policy from recycling items to taking all items and burning them in what is known as the waste to energy process (Davie, 2021). The city of Davie changed its waste management provider to a company that did not provide recycling options, focusing entirely on waste to energy disposal. This switch was made because of the change in the global recycling market and contamination issues (Davie, 2021). Davie, however, is just one small grain of sand on a beach.

The plastic pollution problem is international in scale, however, the response has been anything but international. This is because very little has been done on an international scale to fight plastic pollution directly. While certain countries have individually attempted to tackle the plastic problem, focus and coordination on this issue on the international scene has not been very good. A UNEA resolution End Plastic Pollution: Towards a legally binding instrument was passed that creates an Intergovernmental Negotiating Committee with the purpose of developing a framework for a new plastic pollution treaty (Manfredi, 2022). It aims to complete this framework sometime in 2024, but with the non-binding nature of the UN, and with nations like China and India dragging their feet, many see this as performance and less of substantive and

real action. One other action taken by the international community was the addition of plastic and plastic products to the Basel Convention. This includes plastic products in the Basel Conventions control of the movement of hazardous materials from one country to another (UN, 2019). This allows for more controlled and safer transport of these products over the sea in order to help reduce the amount of plastic that is lost in transport and ends up polluting the oceans.

Several countries have strong plastic recycling policies, but one country that is often cited as having one of the best policies is Germany. Germany has implemented a comprehensive waste management system that encourages recycling, reuse, and waste reduction (Parker, 2020). The country has set ambitious targets for recycling rates and has implemented policies such as mandatory recycling of plastic packaging, a deposit system for plastic bottles, and extended producer responsibility, which holds manufacturers responsible for the entire lifecycle of their products (Parker, 2020). Other countries with strong plastic recycling policies include South Korea, Switzerland, and Austria. These countries have also implemented comprehensive waste management systems that prioritize recycling and waste reduction (Parker, 2020). However, it is important to note that no country has a perfect plastic recycling policy, and there is still much work to be done to address the global plastic waste crisis.

Over the past decade, the US has been struggling on the federal, state, and local level to deal with the issue of plastic accumulation. The federal government has taken a delegative approach implementing very few major federal policies. Federal action has focused on distributing money for recycling, stronger EPA regulations, and international deals looking to fight the problem. Federal institutions have turned down sweeping policies in favor of economic freedom. Therefore, state and local governments have been at the forefront of the effort, but the tactics and devotion to the cause vary greatly throughout the nation. States such as California and Maine have taken steps like banning plastic straws, bags, single use plastic, and encouraging businesses to use other materials through tax incentives or penalties. Meanwhile, states like Florida have looked to prevent bans on those same materials (Mcvey, 2022). Local governments, even within a state, differ to the same extent if not more. With different political ideologies and different issues facing them, certain localities are more concerned with the issue while others give it little thought. This mix of initiatives has created a non-uniform response that results in states and localities having different, conflicting policies which limits potential effectiveness and perpetuates the issues.

On the national level, the US federal government has played a very limited role in fighting plastic pollution directly. Overall many of the policy decisions were left up to the states, but a few policies have been implemented on the federal level. The most common policy implemented has been giving money for research and development for green products and technologies, and money for recycling. In reaction to the 1970's environmentalism movement, they also passed things like the Clean Water Act and created the Environmental Protection Agency (EPA, 1985). Both the Clean Water Act and regulations and rules put in place by the EPA have had direct and indirect effects on plastic pollution. The Clean Water Act calls for the EPA to immediately look to stop plastic pollution and prohibits the discharge of pollution into

US waterways (EPA, 1972). This has been a big part of the fight against marine plastic pollution that is harmful to marine ecosystems and contaminates the water.

Multiple lawsuits have been brought in the name of the Clean Water Act. One key example of this is Coal. to Protect Puget Sound Habitat v. U.S. Army Corps of Engineers, No. 2:21-cv-01685 (W.D. Wash. 2021). In this case an environmental group sued the US Army Corps of Engineers claiming a permit related to shellfish aquaculture violated the Clean Water Act and would result in plastic being introduced into the waterways (PLT, 2022). The court found in favor of the plaintiffs and ruled that the permit would violate the Clean Water Act (PLT, 2022). This ruling opened the door for multiple other complaints and lawsuits that would be filed on similar topics.

The other major avenue has been the EPA and regulations they have put into place regarding plastic manufacturing and delivery. One major lawsuit, FMC Corp. v. Train, No. 74-1386 (4th Cir. 1976), focused on EPA regulations on the pollution output of plastic producers. Here, plastic producers claimed the EPA acted outside its authority under the Clean Water Act and asked for the regulations to be reviewed (PLT, 2022). In the end, the court found in favor of the EPA saying that the regulations fell under their jurisdiction as they were given broad discretion in their role to reduce plastic pollution (PLT, 2022).

State and local governments have passed many laws and resolutions in recent years looking to fight back against plastic pollution. Many however, have seen mixed results and outcomes. We have seen a state like Maine put stewardship programs for packaging into place. Here, producers of goods that use packaging must pay some amount into a fund used to help pay for recycling, invest in recycling infrastructure, and recycling education programs (Maine, 2021). The amount they must pay depends on the amount and recyclability of the packaging that is used (Maine, 2021). California has taken on the policy of giving back money for turning in plastic (California). Specifically they have focused on giving money back for beverage containers. The biggest form of plastic pollution pushback has come in the form of plastic bans. These have taken the forms of bans from single use plastic in general, plastic straws, bags, and other items. Some places have even looked to place a direct tax on these items to incentivize producers to move away from plastic. Many have argued that this decrease in usage is necessary to fight plastic pollution as consumers and producers will not willingly give up plastic. Others though have fought against these bans as going against state constitutions and just going against the idea of a free market economy.

2 cases have pitted cities against the states they are in. These cases include City of Philadelphia et al. v. The Commonwealth of Pennsylvania No. 42 MD 2021 (Pa. Cmwlth. 2021) and Florida Retail Federation v. City of Coral Gables No. 2016-018370-Ca-01 (Fla. Cir. Ct. 2016). In both of these cases, cities, Philadelphia and Coral Gables were trying to implement some form of plastic ban or tax and were being challenged under state law (PLT, 2022). The Philadelphia case came when cities in Pennsylvania sued the commonwealth looking to get a judgment saying that a state statute banning taxes or bans on single use plastics was unconstitutional (PLT, 2022). The case was discontinued and stayed and Philadelphia was able to

implement its ban (PLT, 2022). In the Florida case, a trade association sued the City of Coral Gables claiming a ban on the sale or use of polystyrene containers by city vendors or contractors as being preempted by state statutes (PLT, 2022). In the end, the ban was overturned and ruled that the 3 state statutes were constitutional and preempted the local ordinance (PLT, 2022).

Earth Island Institute v. Crystal Geyser Water Co., No. 20CIV01213 (Cal. Super. Ct. 2020) is another state case focused on plastic, but it pertained to damages caused by plastic pollution. Here, an environmental organization sued plastic bottle producers for damages sustained due to plastic pollution (PLT, 2022). They claimed that as a result of the companies products, damages were sustained that warranted relief. The lawsuit is still ongoing after attempts to move it to federal court and to have it dismissed in state court failed (PLT, 2022). This is a major case that could see plastic product producers held accountable for claimed sustained injuries that their products and the pollution from them have caused.

Overall, with three different levels of US government, plus international organizations and governmental bodies, the policies towards plastic accumulation greatly vary by city, state, and country. While advocacy groups and nonprofits have established basic policies they see as great legal and political policies to fight plastic pollution, many have faced uphill battles in actual adoption and implementation. This has been caused by massive differences in law and political ideology. Without national and international consensus, people have found ways to get around some of these policies by simply moving locations of production or their place of business. It also means that these policies only give us partial effectiveness due to the simple fact that certain nations or places within a nation do not follow or adopt these policies. The problem is that plastic pollution is such a complex problem that a comprehensive and worldwide effort is required in order to fight it effectively. Like any major societal issue though, these policies and the push for them must start somewhere and be led to bigger stages.

III. Culture

Legislative actions play a vital role in combating plastic waste production by introducing and enforcing regulations, supporting recycling programs, and incentivizing sustainable practices. However, it is important to also consider the behaviors and attitudes towards waste at an individual level. Cultural attitudes towards waste, the environment, and plastic use may have significant impacts on widespread behaviors that result in plastic pollution. In the United States, the plastics recycling rates decreased from an already-low 9% in 2018 to almost 5% in 2021 (Greenpeace USA, 2022). Considering the immense quantity of plastic waste produced by the United States, recycling, as it currently exists, does not appear to be an adequate solution to plastic pollution. By delving into the cultural frameworks which influence Americans' waste management behaviors, we may better-understand the scope of the issue and identify potential pathways for reform.

Because single-use plastics are the heaviest contributors to plastic pollution, the everyday consumption and disposal habits of individuals is a major target for reform. To combat plastic pollution at its roots, two broad cultural issues can be identified: limited knowledge of how to

reduce one's impact on the environment, and limited motivation to make sustainable choices. Limited knowledge is linked to the aforementioned complexity of environmental sustainability. For example, take the issue of single-use plastic grocery bags- a major contributor to plastic pollution. There are a range of alternatives for the environmentally-conscious, from single-use paper bags, to reusable plastic bags and reusable cotton totes. It may be a surprise to some that plastic bag *production* has a very low carbon footprint. While paper bags quickly degrade in the environment after disposal, the production process actually produces more carbon emissions; in order for a brown paper bag to have the same environmental impact as a plastic bag, ignoring the differences in disposal, it would need to be used over 40 times- well beyond the expected lifespan of a standard paper bag. On the other hand, reusable plastic totes last indefinitely, and only need to be reused around 50 times in order to offset their environmental impact. Cotton totes however, because of the vast amounts of water, fertilizer, and pesticides that are required for cotton production, have a huge impact on the environment. Cotton totes are estimated to need to be reused over 7,000 times in order to offset their environmental impact. Thus, while cotton may seem to be the more sustainable option due to its biodegradability, reusable plastic totes are likely far better options (SciShow, 2021). The sustainable solution, clearly, can be counterintuitive and complex, and mitigating limited knowledge may require intensive education and awareness efforts.

Perhaps the generational differences in recycling behaviors can point to the larger cultural obstacles to reducing plastic waste. Generation Z, which consists of individuals born between 1997 and 2012, have some of the lowest rates of recycling. Factors that contribute to this may include barriers to recycling, such as a lack of clear disposal instructions and confusion over what can be recycled (Recycling Product News, 2022). Given the complexity and variety of recycling programs across the country, it's difficult to dismiss the validity of these concerns. However, they indicate a larger issue that may arise as time goes on: futility.

The other cultural issue for plastic waste management, limited motivation, is also complex, but it may be better understood through the psychological framework known as the "theory of planned behavior." The theory of planned behavior provides a way of understanding how an individual's beliefs influence their behavior. Specifically, there are three core facets of the theory of planned behavior: attitude, subjective norms, and perceived control.

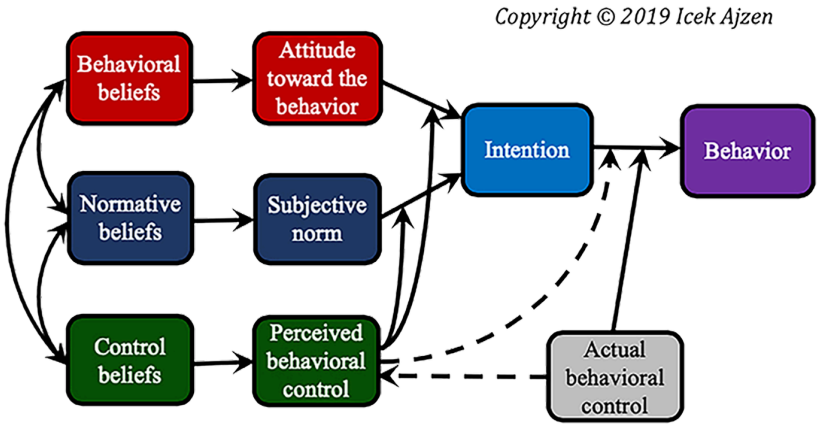

FIGURE 2. Ajzen, I. (2019). Theory of planned behavior diagram. Retrieved from https://people.umass.edu/aizen/tpb.diag.html

In the context of plastic waste, an individual's attitude towards reducing their waste, the perceived social pressure to do so (subjective norms), and perceived ability to make an impact on plastic waste, all play a role in determining one's level of motivation to engage in plastic waste management behaviors. The theory of planned behavior can be useful for understanding why some individuals may be less motivated to reduce their plastic waste than others, and for identifying potential interventions to increase motivation (Bosnjak et. al., 2020).

An individual's attitude towards reducing their plastic waste will influence their motivation to engage in behaviors that reduce their plastic waste. For example, if an individual has a positive attitude towards reducing their plastic waste and believes that it is important to do so, they will be more motivated to engage in behaviors that reduce their plastic waste, such as using reusable bags, bottles, and containers, recycling, and reducing their overall consumption of single-use plastics. On the other hand, if an individual has a negative attitude towards reducing their plastic waste, they may not be motivated to engage in behaviors that reduce their plastic waste. For example, if they believe that reducing their plastic waste is inconvenient, costly or unnecessary, their motivation to engage in those behaviors will be low.

If an individual perceives that their family, friends, and community members value reducing plastic waste, they will also be more motivated to engage in behaviors that reduce their plastic waste. They may feel pressure to conform to these norms and may be more likely to engage in behaviors that reduce their plastic waste as a result. On the other hand, if an individual perceives that their family, friends, and community members do not value reducing plastic waste or do not consider it important, they may not be motivated to engage in behaviors that reduce their plastic waste.

Lastly, if an individual perceives that they have low control over their plastic waste and that their actions will not make a difference, they may feel that reducing their plastic waste is futile and therefore may not be motivated to engage in behaviors that reduce their plastic waste. To increase motivation, it is important to increase an individual's perceived behavioral control by

providing them with the resources, skills, and opportunities to reduce their plastic waste. Additionally, providing information about the impact of plastic waste on the environment, the collective actions that can make a difference, and the benefits of reducing plastic waste, can help to decrease the perception of futility.

Cultural attitudes towards waste and disposability are an important factor that impacts both behavioral attitudes and subjective norms. In many countries, including the United States, a culture of convenience and disposability has emerged, where people are quick to discard broken or worn items in favor of buying new ones. This cultural attitude has contributed to the proliferation of plastic waste in the environment, which is one of the most persistent and pervasive forms of pollution.

The origins of this cultural attitude can be traced back to the rapid expansion of consumer culture in the 20th century and the promotion of plastic as a futuristic technology that would make people's lives easier and more convenient. Advertisements in the early 20th century portrayed plastic as a material that would free people from the burdens of household chores and make menial tasks more convenient. This messaging, combined with increasing wealth and a growing consumer culture, helped to create a culture of disposability, where people were encouraged to use disposable products and dispose of them after a single use (Lim, 2019).

Despite the significant impact of plastic pollution, cultural attitudes towards waste and disposability have been slow to change. However, in recent years, there has been a growing awareness of the environmental impact of plastic waste, and a growing movement towards reducing waste and promoting sustainability.

One example of a changing cultural attitude towards waste and disposability is the rise of the zero-waste movement, which promotes reducing waste and promoting sustainability. The zero-waste movement encourages people to reduce their use of single-use plastics, such as disposable water bottles and plastic bags, and to recycle and compost their waste. Another example of a changing cultural attitude towards waste and disposability is the promotion of repair and reuse (EPA, 2022). In the past, people were much more likely to repair and mend their belongings rather than throw them away, and in many parts of the world, repair shops are still a common feature of communities. However, in the United States and many other countries, repair shops are becoming less common, and people are quick to dispose of broken or worn items. The promotion of repair and reuse is an important way of addressing cultural attitudes towards disposability, as it encourages people to extend the life of their belongings and reduce their use of new products.

SECTION TWO - Generational Shifts

Environmental issues have become a major concern for younger generations. According to a Pew Research Center survey, younger generations are more likely to prioritize climate change than older generations (Nadeem, 2022). This concern extends to plastic waste and pollution. Many young people are increasingly aware of the negative impact of plastic on the environment and are actively looking for ways to reduce their plastic consumption. However,

despite their concern for the environment, young people do not always take action when it comes to things like recycling. The Institute of Scrap Recycling Industries (ISRI) conducted a survey that found that younger Americans aged 18-34 are less likely to recycle than older generations (ISRI, 2014). The survey also found that younger Americans are less likely to believe that recycling is critical to reducing energy consumption or will help reduce landfill space.

Furthermore, while a majority of Americans say they recycle, those aged 35 and older are significantly more likely to say they always recycle than those aged 18-34 (ISRI, 2014). These findings suggest that younger generations may not be as committed to recycling as we might assume. There are several reasons why younger people may not recycle as often as older generations. First, younger people may live in areas where recycling options may be less accessible or less prioritized by local governments. Second, younger people may be less financially stable, making it more difficult for them to prioritize environmentally-friendly products or services. Finally, younger people may be more likely to be influenced by social media, which can amplify the appearance of sustainability and activism but may not necessarily translate into practical action.

Given the complexity and lack of transparency in the processes regarding recycling, it's understandable why young people as a whole may have a cynical attitude towards recycling and plastic waste. However, despite the flawed system and the uncertainty of the future, these attitudes are not helpful. Thus, in addition to reforming plastic waste management practices and policies, a cultural shift that promotes environmental sustainability and waste reduction is of utmost importance.

The impact of mass consumerism on sustainability has greatly influenced the younger generation's perception of the environment. On one hand, mass consumerism has fostered a culture of overconsumption that emphasizes material possessions as indicators of success and happiness, leading to waste and environmental deterioration. This culture can make it challenging for younger generations to appreciate the significance of sustainability, as they are inundated with messages promoting the acquisition of more and more products. Moreover, mass consumerism promotes a linear economy, where products are manufactured, used, and then discarded instead of a circular economy that conserves and reuses resources. This approach contributes to a sense of disposability among younger generations, who view products as disposable rather than valuable resources that should be conserved.

The disposable culture propagated by mass consumerism also encourages the disposal of items after using them once or twice. This trend has resulted in an increase in single-use packaging, which is not recyclable, leading to lower recycling rates and increased waste. The manufacturing of more goods than necessary, driven by the culture of overconsumption, leads to an increase in the number of products ending up in landfills, further reducing the amount of materials available for recycling. The more we consume, the more waste we produce, and the lower the recycling rates.

As a result of mass consumerism, the demand for recycled products exceeds the supply, but the lack of recycling infrastructure to meet this demand leads to recyclable materials ending

up in landfills. This lack of recycling infrastructure is a significant contributor to low recycling rates, contributing to environmental degradation. However, younger generations are becoming increasingly aware of the negative effects of overconsumption, and mass consumerism can act as a catalyst for positive change if people are encouraged to think critically about their consumption habits and take steps to reduce their environmental footprint.

To address these challenges, it is essential to take a broader view of sustainability that includes reducing waste and consumption, promoting reuse and repair, and investing in sustainable infrastructure and systems. The logistics sector, in addition to culture, politics, and society, plays a crucial role in shaping young people's views on sustainability and plastic pollution. The sector is responsible for transporting and delivering goods that contribute to plastic pollution, particularly with the rise of e-commerce and online shopping leading to increased use of packaging materials. The role of capitalism, businesses, and technology is crucial in shaping the younger generations' view of sustainability, as they have the power to either contribute to environmental degradation or promote sustainable practices. Capitalism's focus on growth and profit can often come at the expense of the environment, with businesses being the main drivers of this economic system. However, businesses can also use sustainable practices and technologies to reduce their environmental impact, promoting a more sustainable future.

Businesses, governments, and individuals all have a role to play in reducing their environmental impact and supporting sustainable practices. This may include supporting legislation or initiatives that prioritize sustainability, investing in renewable energy or sustainable products, or promoting education and awareness about environmental issues.

The interplay between politics and business practices also affects young people's attitudes towards plastic waste and recycling. Government policies and regulations can incentivize businesses to implement more sustainable practices, such as reducing plastic packaging or investing in more environmentally friendly products. However, politics can also hinder progress towards sustainability. For instance, the Trump administration rolled back many environmental regulations, which could have a long-lasting impact on the environment and public health.

The business practices of companies also play a role in shaping young people's attitudes towards plastic waste and recycling. Many young consumers are increasingly conscious of the environmental impact of the products they buy and are willing to pay more for sustainable and environmentally friendly products. However, some companies may engage in "greenwashing" - using marketing tactics to make their products appear more environmentally friendly than they actually are - which can lead to skepticism and distrust among consumers, particularly younger consumers who are more likely to research the environmental impact of products before making a purchase. While younger generations are increasingly concerned about plastic waste and pollution, their attitudes towards recycling may be influenced by broader societal and economic factors. It is important to address these underlying factors and to create policies and practices that incentivize sustainable behavior.

As part of the effort to improve cultural and social attitudes towards plastic waste reduction in South Florida, it is important to note the many local organizations working towards environmental sustainability through volunteerism, education, and community engagement. One of these organizations is the Nova Southeastern University(NSU) Marine Environmental Education Center (MEEC). The center provides a range of educational programs and exhibits that promote awareness and conservation of the marine environment. It features interactive exhibits that highlight South Florida's unique marine ecosystems, including mangroves, seagrass beds, and coral reefs. The center also includes an outdoor pool housing two green sea turtles, Captain and Coral, who were previously injured by human activity and now serve as educational ambassadors through daily feeding observations. The center also hosts field trips for schools and other groups, providing a unique learning experience for students of all ages.

Another local organization is the Youth Environmental Alliance (YEA), a non-profit that operates in Broward County, Florida, with a focus on promoting environmental education, conservation, and activism among young people. The organization's mission is to inspire and empower the next generation of environmental leaders by providing them with the knowledge, skills, and opportunities to make a positive impact on the world around them. YEA offers a wide range of programs and activities designed to engage and educate youth about environmental issues, such as climate change, pollution, and habitat destruction. These programs include field trips, eco-camps, community service projects, and environmental education workshops, all of which are designed to help youth develop a deep appreciation for the natural world and a strong commitment to preserving it. In addition to its programs, YEA hosts various events and initiatives aimed at raising awareness about critical environmental issues and inspiring action. These events include beach cleanups, tree plantings, and environmental festivals, which are open to anyone interested in making a positive impact on the environment.

SECTION THREE - Recommendations

Introduction

The initiatives presented aim to cover various facets of sustainability and offer insights into ways that individuals, organizations, and institutions can encourage environmentally friendly practices and minimize waste. The policy initiative examines how the city of Davie (and others) can enhance its waste management system by forming partnerships with recycling companies and reintroducing residential and commercial recycling collection. The second initiative highlights the essential elements of a successful recycling program on a college campus, including waste analysis, outreach activities, and composting efforts. The third initiative suggests a curriculum for educating first-year students at NSU university on sustainability, emphasizing the three pillars of sustainability: environmental, social, and economic. Overall, recommendations stress the significance of sustainability and explore different approaches for achieving a more sustainable future.

Initiative I: Policy

As previously mentioned, the city of Davie does not actually recycle items, but instead converts recyclables and trash into energy by burning them, a process known as "waste to energy," (Davie, 2021). This switch was made because of the change in the global recycling market and contamination issues. Many cities in Southeast Florida and cities across the country have had to follow this exact same path. This has created a problem where cities have gone from partial recycling systems to none at all. Instead, more landfills and "waste to energy" policies have been taken on by cities, and neither are as clean and environmentally friendly. Recycling programs in cities need to be brought back, but an effective and efficient program and system is required in order to make it sustainable. A start for this can see Davie (and other cities) reintroduce residential recycling pickups. This would be done through a single stream recycling process where residents are given the education and incentive to properly use recycling bins and allow for the local government to then transport it.

Part of this idea has been put in place by the city of Fort Lauderdale. In Fort Lauderdale, they have what they call the "Mix It. Curb It." recycling program for residential recycling (Fort Lauderdale 2012). In this program, residents have recycling bins where they place all recyclables together in one bin. This is meant to make it easier for residents. This is partnered with a program looking to decrease contamination. The city government lists what is available to be put in these big bins and what is not on the bins themselves. The city can also issue an "Uh Oh" notice to residents as reminders of these guidelines. This notice is issued when a collection driver notices something about your bin contents that is incorrect and may cause contamination problems. The city uses a four stage communication process to correct contamination (Fort Lauderdale 2012).

1. First Contamination: You likely received an "Uh Oh" notice. An "Uh Oh" notice is just a friendly reminder to follow recycling guidelines.
2. Second Contamination: A notice will be placed on the cart handle. The cart will not be serviced. Please remove the contents, sort appropriately, and set out your carts the following pick-up day. Please pay special attention to what goes into your blue cart in the future. Recyclables only, please.
3. Third Contamination: Same as above. In addition, a representative of the Office of Sustainability will contact you to provide additional instruction, up to and perhaps including an on-site visit
4. Fourth Contamination: The blue cart will be removed from your property. Recycling service will not be provided to your household. You may contact Customer Service for more information.

This communication process allows for residents to learn and fix mistakes and problems with their recyclables, while also making sure that should contamination issues continue, the resident will not be allowed to possibly contaminate the truckload of recyclables. This gives a balance between giving second chances and also making sure that constant rule breaking does not continue to impact the effectiveness of the program. This has resulted in a massive uptick in

recycling for Fort Lauderdale who have seen a significant increase in tonnage collected since the program started in 2012.

This program is a good base policy for cities to bring back recycling for residents that is easy but can still be effective. This policy also serves as a foundation to a more detailed recycling program. Cities can use this process to bring back recycling while working with private companies. Cities can bring these loads of recyclables to a central location where they can have people sort through it into separate categories there. While this does put more responsibility on the city, it allows for residents to more properly focus on contamination. After this is done, private recycling and waste management companies like Waste Management Inc., a popular waste management and recycling company that runs facilities all over including in Southeast Florida can be brought into the system. Having central drop-off locations with pre-separated recyclables can incentivize these companies to actually accept contracts with cities to recycle as they do not have to take on more labor to sort the recycling. With the comprehensive city recycling pickup program it will also help reduce contamination again furthering the incentive for private companies. These companies can then transport the recyclables to locations where they can be processed.

This addition to Fort Lauderdale's program allows for a split between the public and private sector to fix this issue. This creates this three part system where each group has their own part to focus on to separate the cost. Residents can focus on fixing contamination. Cities can focus on separating the recyclables and enforcement of the contamination policies. Private companies can then focus on transport of the materials from central locations and the actual processing. This allows for a combined effort to share the cost and allow for all groups involved to benefit. A program like this can also help increase collaboration between cities like Fort Lauderdale and Davie who are so connected and intertwined. It would allow for cities to come together and share and use central locations and share costs so that all can have the benefits. This will be especially helpful when looking at smaller municipalities like Davie who may need extra help and have bigger municipalities like Fort Lauderdale nearby. Last, the program can be used all over too, not just in Davie but in cities all over the country.

Initiative II: Action

On-Campus Recycling Program

As sustainability becomes an increasingly important issue, more and more universities across the United States are implementing on-campus recycling programs. While creating a new on-campus recycling program may be challenging, there are a number of universities that can act as models during this process. For example, at American University (AU) the recycling program is designed to reduce waste and promote sustainability on campus. The university has implemented a mixed recycling program, which allows for the recycling of a variety of materials, including paper, bottles, cans, and plastics, in one container. Landfill and compost are stored in separate bins, and trash and compostable materials should be sorted into those containers, respectively (American University).

In addition to mixed recycling, AU has several other recycling initiatives, including the collection of e-waste, batteries, plastic bags and wraps, ink cartridges, and furniture. Recycling bins and collection points are located throughout campus, including in residence halls, academic buildings, and administrative offices. AU's Office of Sustainability works to educate the campus community about recycling and sustainability through a variety of programs and initiatives, such as outreach campaigns, educational materials, and sustainability events (American University). The university also partners with local organizations and recycling facilities to ensure that materials are properly processed and recycled.

Looking at NSU's current recycling program, it is quite limited. All recyclables are collected in one container, and there is minimal oversight to prevent contamination of recyclables. Because contamination and unsortable recycling bins prevent these items from being recycled at all, it is important to develop an organized, practical model of recycling to implement on campus. Specifically, a recycling program should be developed for implementation at the residence halls, which include Mako Hall, Leo Goodwin Sr. Hall, the Commons, Cultural Learning Center (CLC), and Farquhar Founders and Vettel (FFV). Focusing the recycling program to the residence buildings will allow for an organized and implementable initiative that has a great impact, and could later be expanded to other aspects of the NSU campus.

1. Comprehensive Waste Audit:
    a. Conduct a waste audit to capture both visible and hidden waste.
    b. Audit and recycling program will be focused on The Commons, Mako Hall, FFV, CLC, and Leo Goodwin Sr. Hall.
    c. Provide a more accurate picture of the state of recycling in the dorms.
    d. This process will focus on one building at a time to ensure thoroughness.
2. Recycling Analysis:
    a. Analyze results of the waste audit to identify the most commonly discarded recyclable items in the dorms.
    b. Consider the feasibility and effectiveness of recycling different materials.
        i. Keep in mind the importance of proper sorting: depending on which recycling plant whose services are utilized, recyclables may need to be sorted differently
        ii. The goal is creating a recycling system that simply works and can be expanded, not one that necessarily eliminates 100% of recyclable waste immediately
    c. Determine the number and size of bins required to be placed in each dorm room.
    d. Guide the development of a targeted recycling program.
3. Targeted Recycling Program:
    a. Develop a targeted recycling program that focuses on the most important materials.

        i. Focus on materials that are identified to have the greatest potential for recycling at the dorms.
    b. Provide clearly marked recycling bins for each material and clear instructions on what can and cannot be recycled.
    c. Plastics will be a major target, but another likely target for recycling is aluminum
        i. Consider that depending on the recycling plant, aluminum may not need to be sorted separately, as many plants effectively sort aluminum with electromagnets.
    d. Partner with local waste management businesses to provide clean, easily sortable or already sorted recyclables.
4. Education and Outreach:
    a. Integrate this initiative with education and outreach program on the importance of recycling and proper recycling practices (see next initiative)
    b. Provide posters, flyers, and other materials that are visible and accessible to students, staff, and faculty.
    c. Partner with student organizations and clubs such as Green Sharks to help spread the message.
5. Sustainable Oversight:
    a. Develop a sustainable oversight plan to ensure proper recycling practices are being followed.
    b. Train Resident Assistants (RAs), staff, or volunteers to monitor recycling bins and ensure only clean and properly sorted materials are being recycled.
    c. Incentivize proper recycling practices with rewards for dorm rooms that demonstrate high levels of recycling success.
        i. Reward may be monetary or in the form of special services or distinctions
6. Cardboard Recycling:
    a. Implement a year-round system for cardboard recycling, considering the high need for cardboard waste management during move-in and move-out weeks.
    b. Place large cardboard recycling bins in each hallway or floor and ensure they are emptied regularly.
    c. Partner with local businesses to collect cardboard boxes for recycling.
7. Regular Evaluation and Next Steps:
    a. Conduct regular evaluations of the recycling program to determine effectiveness and identify areas for improvement.
    b. Conduct surveys, analyze recycling rates, and gather feedback from students and staff.
    c. Use information gathered to make necessary adjustments to the program and ensure continued success.

d. Based on these evaluations, determine improvements or adjustments that may be required to expand this recycling program to other parts of the NSU campus, beyond the undergraduate residence halls.

Initiative III: Education

a. First Year Experience Module

Sustainability and recycling have become increasingly more important topics in today's world, as people recognize the need to preserve our planet's resources and protect the environment for future generations. In order to prepare the next generation of leaders, it is important to provide students with a comprehensive education on sustainability and recycling.

An approach to teaching sustainability to first year students could be accomplished via the "UNIV 1000" class at NSU. This is a required class that all NSU freshmen take during their first semester of enrollment. The course covers information for first-year students, from campus resources to Title IX training.This module aims to educate college students on sustainability, with a focus on recycling. The goals and objectives of the module include introducing the concept of sustainability and its three pillars, encouraging sustainable lifestyle choices, and examining real-world examples of sustainable practices and initiatives in various sectors through case studies. The methodology of the module will involve a blend of presentations, interactive exercises, and group conversations, with students encouraged to contribute their thoughts and observations throughout the course of instruction. The module will be delivered via Canvas, with different components like readings, videos, and diagrams to deliver the content to students.

The content of the module will cover the introduction to sustainability, defining and outlining recycling, the pillars of sustainability, the importance and understanding of recycling. It will also discuss the benefits of recycling and how to participate in them here on campus. Later modules will examine how recycling works, the sorting and processing of recyclable materials, and manufacturing and use of recycled products. The course will also provide tips for effective recycling, debunking common recycling myths, and discussing sustainable lifestyle choices. Possible activities or projects that can be assigned to students after completion include written reflections, where students can reflect on what they learned and how they will apply the concepts in their lives, and group projects, where students can develop initiatives to promote recycling on campus or in their communities.

Overall, the course will provide students with a comprehensive education on sustainability and recycling, hopefully encouraging them to make sustainable lifestyle choices and create a more sustainable future. By introducing students to the concept of sustainability and its three pillars and examining real-world examples of sustainable practices, students will be better equipped to make informed decisions about sustainability and recycling. A tentative outline for the course is provided below:

1. Goals & Objectives:
    a. To provide students with a comprehensive education on sustainability.

b. To introduce students to the concept of sustainability, including its definition and the three pillars: environmental, social, and economic.
c. To educate students on the importance of sustainability and its impact on daily lives.
d. To explore the environmental pillar of sustainability, focusing on climate change, sustainable energy, biodiversity conservation, and waste reduction and management.
e. To discuss social sustainability, including social equity and justice, sustainable urban planning and transportation, and sustainable agriculture and food systems.
f. To emphasize the economic pillar of sustainability, with a focus on sustainable business practices and green finance, and introduce the circular economy.
g. To encourage sustainable lifestyle choices, such as sustainable consumption and production, water conservation, and energy efficiency.
h. To examine real-world examples of sustainable practices and initiatives in various sectors through case studies.

2. Methodology
    a. The module will utilize a blend of presentations, interactive exercises, and group conversations. Students will be encouraged to contribute their thoughts and observations throughout the course of instruction.
    b. The syllabus curated by the instructor will dedicate class time to discussing the content of the course as it relates to on-campus sustainability efforts.
3. 3. Organization:
    a. This course will be delivered via Canvas much like the other initiatives discussed in the “UNIV 1000” course.
    b. The module will have a number of different components like readings, videos and diagrams to convey the content to students and can be discussed during class.
4. Content:
    a. Introduction
        i. Definition of sustainability and its importance
        ii. Define and outline recycling
    b. Pillars of Sustainability
        i. Environmental Pillar of Sustainability
            1. Climate change and its impacts on the environment and society
            2. Case studies and real-world examples of environmental sustainability
        ii. Social Pillar of Sustainability
            1. Social equity and justice in sustainability
            2. Case studies and real-world examples of social sustainability
        iii. Economic Pillar of Sustainability
            1. Sustainable business practices

        2. Case studies and real-world examples of economic sustainability
c. Definition and Importance of Recycling
d. Understanding Recycling:
    i. Types of Materials that Can Be Recycled: This section explains how most materials can be recycled, including paper, plastics, glass, metals, and electronics. However, not all recycling programs accept the same materials. It is important to check with your local recycling program to see what materials they accept. Common items that can be recycled include:
        1. Paper: newspapers, magazines, cardboard, and office paper
        2. Plastics: bottles, containers, and bags
        3. Glass: bottles and jars
        4. Metals: aluminum cans, steel cans, and foil
        5. Electronics: computers, phones, and televisions
    ii. Benefits of Recycling
e. Recycling Programs
    i. Recycling Programs at the NSU
    ii. How to Participate in Recycling Programs: This section describes how college students can recycle on campus. First, they can recycle in dorms by separating recyclable materials from other waste and placing them in designated recycling bins. Second, students can recycle on campus by using the recycling bins provided by their college or university. Finally, students can participate in community recycling programs by finding local recycling centers and drop-off locations.
f. How Recycling Works
    i. Collection and Transportation of Recyclable Materials: This section outlines the process of collecting and transporting recyclable materials to recycling centers, where they are sorted by type and thoroughly cleaned of any impurities or non-recyclable items.
    ii. Sorting and Processing of Recyclable Materials: This section describes how recyclable materials are usually categorized into paper, plastic, glass, and metal, with some facilities sorting by type or color. These materials are then prepared for processing, which differs depending on the material. Paper is baled and sent to a paper mill, plastic is shredded and melted, and glass and metal are crushed and melted for reuse.
    iii. Manufacturing and Use of Recycled Products: This last section explains that the recycling processes vary based on the material and product. Plastic bottles can be melted and molded into new items, while paper can be pulped into new paper. Using recycled products helps save resources, reduce landfill waste, and typically uses less energy than producing new items from virgin materials.

g. Best Practices for Recycling
    i. Reduce, Reuse, and Recycle: This section describes the three key principles of waste management that aim to reduce the amount of waste generated, conserve resources, and minimize the negative impacts of waste on the environment.
    ii. Importance of Proper Disposal: This section stresses how the proper disposal is of utmost importance in the recycling process. Failure to sort and dispose of recyclable materials correctly can contaminate the recycling stream, making it challenging to separate and recycle the different materials. Contamination may occur when non-recyclable materials or food waste are mixed with recyclable materials, rendering the whole batch unrecyclable.
    iii. Tips for Effective Recycling: This section offers simple practices to increase recycling:
        1. Know what materials can be recycled and what cannot.
        2. Rinse out containers before placing them in the recycling bin.
        3. Remove caps and lids from containers before recycling them.
        4. Flatten boxes and containers to save space in the recycling bin.
        5. Do not put recyclables in plastic bags, as they can clog recycling machines.
        6. Recycle old electronics by donating them to local organizations or taking them to electronic recycling centers.
    iv. Debunking Common Recycling Myths
h. Sustainable Lifestyle Choices
    i. Sustainable consumption and production
    ii. Individual impact on the environment and ways to reduce it
i. Conclusion
    i. Recap of the importance of sustainability and its three pillars: environmental, social, and economic
    ii. Call to Action for Recycling
    iii. Encouragement to take action and create a more sustainable future
    iv. Final thoughts and call to action for college students to make a difference.

5. Possible Activities or Projects:
    a. Assign written reflections:
        i. Ask students to write a reflection on the chapter they studied. This reflection could be in the form of an essay, blog post, or journal entry.
        ii. Students could be asked to reflect on what they learned, how they will apply the concepts in their lives, and any questions they still have about
    b. Hold a group discussion:

i. Facilitate a class discussion where students can share their thoughts on the chapter and engage with their peers.
ii. Open-ended questions could be posed to prompt discussion or ask students to come prepared with questions to ask each other.

b. Education Workshops: Plastic Waste Reduction for College Students

The workshop aims to educate and empower college students to reduce their plastic waste and advocate for plastic-free living. It will be facilitated by knowledgeable experts who will provide a comprehensive overview of plastic pollution, its impact on the environment and human health, and the role of plastic in our daily lives. An icebreaker activity will be conducted to get participants engaged and comfortable. The workshop will then focus on sustainable alternatives to plastic products. Participants will be introduced to various eco-friendly products and materials that can be used instead of plastic. They will engage in an interactive activity where they can try out different products and learn about their advantages and disadvantages. This activity will encourage participants to think critically and creatively about their consumption habits and make informed choices. A tentative outline for this workshop is provided below:

1. Goals & Objectives:
    a. To educate NSU students on the impacts of plastic waste on the environment and human health.
    b. To provide students with practical ways of reducing their plastic waste and encourage sustainable habits.
    c. To educate students on proper recycling practices so they can be informed and confident in their ability to contribute to sustainability.
    d. To encourage students to spread their knowledge and habit amongst their friends by becoming advocates for sustainability in their communities.
2. Methodology
    a. The workshop will be conducted through a combination of presentations, interactive activities, and group discussions. Participants will be asked to share any perspectives or insights throughout the workshop.
    b. Participants will be provided with an organized, easy-to-reference handout at the end of the workshop, which summarizes the content and provides links to additional information. This will help ensure that students can continue to share what they learned in the workshop with peers.
    c. Attending this workshop may be incentivized in a variety of ways by connecting with other University departments and faculty, including:
        i. Counting for ExEL (Experiential Education and Learning) credit
        ii. Promotion as an extra-credit opportunity for coursework
        iii. Providing opportunities to win desirable prizes throughout the workshop
        iv. Providing free lunch for participants

v. Present participants with a certificate upon completion that recognizes what they learned

3. Organization:
    a. The workshop will be conducted in a classroom or seminar setting with up to 50 participants. There will be 1-2 main instructors and multiple additional facilitators that may go around and facilitate discussions throughout the workshop.
4. Content
    a. Introduction to Plastic Waste: This section will provide an overview of the current state of plastic pollution, its impact on the environment and human health, and the need for urgent action. This sections should aim to motivate students to take action by stressing the drastic consequences of plastic pollution while encouraging students that they can make a difference.
    b. Strategies for Reducing Plastic Waste: This section will explore practical ways that students can reduce their plastic consumption and waste, including:
        i. Choosing reusable alternatives to single-use plastics (e.g., water bottles, bags, utensils, straws).
        ii. Avoiding products with unnecessary packaging and plastic.
        iii. Recycling properly and responsibly.
        iv. Composting food waste and other biodegradable materials.
    c. Sustainable Habits: This section will provide tips and advice on how to adopt sustainable practices that extend beyond just reducing plastic waste. By incorporating these habits into their lives, students will develop confidence in their ability to be environmentally conscious and lead sustainable lifestyles. These practices will include:
        i. Conserving energy and water
        ii. Supporting local and sustainable food systems
        iii. Reducing carbon emissions
    d. Action Planning Activity: Participants will do an activity in which they are asked to write down 3-5 changes they can make in their daily lives that will help them reduce their contribution to plastic waste or promote sustainability in their community. These may include minor individual changes or larger ambitions for their community. They will then share their responses among small groups.
    e. Group Discussion: Participants will have the opportunity to share their ideas and experiences, discuss challenges and opportunities for change, and reflect on what they learned during the workshop.
5. Evaluation:
    a. Participants will be given a pre-workshop survey to assess their knowledge of plastic pollution and plastic waste reduction. At the end of the day, a post-workshop survey will be done to evaluate the effectiveness of the workshop. Participants may be asked to provide feedback for future workshops.

CONCLUSION

Sustainability and environmental consciousness have become increasingly important in modern society. Initiatives such as on-campus recycling programs, public waste management systems, and education plans focused on sustainability are vital in ensuring a more sustainable future for generations to come. It is important to assess and identify the types and quantities of waste generated and to identify items that can be recycled. Recycling bins should be placed in various locations with clear labels to encourage proper disposal of recyclable materials. Community outreach programs and education plans are necessary to raise awareness about the benefits of recycling and the role individuals can play in promoting sustainability. Through a comprehensive approach to sustainability, significant strides can be made towards reducing our environmental impact and creating a more sustainable future.

However, the only way to start the process is to start working globally. With major obstacles like government policy, logistic issues, and culture, there is a lot to tackle. This will especially come into play when looking at the younger generations. With these generations being more passionate, but also being more hopeless about the future, the problem will need to start to be looked at more seriously in the years to come.

References

Bosnjak, M., Ajzen, I., & Schmidt, P. (2020). The Theory of Planned Behavior: Selected Recent Advances and Applications. Europe's journal of psychology, 16(3), 352–356. https://doi.org/10.5964/ejop.v16i3.3107

Cashing In. (n.d.). CalRecycle Home Page. https://calrecycle.ca.gov/bevcontainer/consumers/cashingin/#:~:text=That%20symbol%20means%20the%20container

Center for International Environmental Law. (2017, December 5). *Plastics industry knew its products were polluting oceans by 1970s, then spent decades denying responsibility and fighting regulation*. CIEL.org. Retrieved April 6, 2023, from https://www.ciel.org/news/plastics-industry-knew/

Center for International Environmental Law. (2022). *Fueling plastics - center for international environmental law*. CIEL.org. Retrieved April 6, 2023, from https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-Plastic-Industry-Awareness-of-the-Ocean-Plastics-Problem.pdf

Cho, J. (2017, November 11). *What happens to all that plastic?* State of the Planet. Retrieved April 4, 2023, from https://news.climate.columbia.edu/2012/01/31/what-happens-to-all-that-plastic/#:~:text=Most%20of%20the%20rest%20ends,and%20safety%20of%20marine%20life.

Environmental Protection Agency. (2021). EPA. Retrieved March 23, 2023, from https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/advancing-sustainable-materials-management

Environmental Protection Agency. (2022). *How communities have defined zero waste*. EPA. Retrieved March 23, 2023, from https://www.epa.gov/transforming-waste-tool/how-communities-have-defined-zero-waste#:~:text=The%20zero%20waste%20approach%20seeks,into%20nature%20or%20the%20marketplace.

Extended Producer Responsibility for Packaging, Waste Management, Maine Department of Environmental Protection. (n.d.). Www.maine.gov. https://www.maine.gov/dep/waste/recycle/epr.html

Freinkel, S. (2011, May 29). *A brief history of plastic's conquest of the world*. ScientificAmerican.com. Retrieved April 6, 2023, from

https://www.scientificamerican.com/article/a-brief-history-of-plastic-world-conquest/

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, *3*(7). https://doi.org/10.1126/sciadv.1700782

Greenpeace USA. (2022, October 24). *Circular claims fall flat again*. Greenpeace USA. Retrieved March 24, 2023, from https://www.greenpeace.org/usa/reports/circular-claims-fall-flat-again/

Institute of Scrap Recycling Industries, Inc. *Younger Americans not as "green" as older generations*. ISRI. (2014). Retrieved March 23, 2023, from https://www.isri.org/news-publications/news-details/2014/11/13/younger-americans-not-as-green-as-older-generations

Lim, X. Z. (2019, May 16). *The deceptive way ads got us hooked on plastics*. HuffPost. Retrieved March 23, 2023, from https://www.huffpost.com/entry/vintage-ads-plastic_n_5cdb1768e4b01e9bd3540ffa

Manfredi, R. (2022, March 22). *Update on UN Roadmap for a New Global Plastics Treaty*. Gibson Dunn. https://www.gibsondunn.com/update-on-un-roadmap-for-a-new-global-plastics-treaty/#_ftn1

Nadeem, R. (2022, April 28). *Gen Z, millennials stand out for climate change activism, social media engagement with issue*. Pew Research Center Science & Society. Retrieved March 23, 2023, from https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out-for-climate-change-activism-social-media-engagement-with-issue/

Officials: Florida's preemptive laws hamper fight against microplastics. (n.d.). Www.baynews9.com. Retrieved April 12, 2023, from https://www.baynews9.com/fl/tampa/news/2022/06/21/microplastics-and-florida-s-preemptive-laws#:~:text=That%20includes%20Florida%2C%20the%20very

Overview. (n.d.). Www.basel.int. http://www.basel.int/Implementation/Plasticwaste/Overview/tabid/8347/Default.aspx

Parker, T. (2019, March 18). *World Recycling Day: Here's the five best recycling countries in the world*. NS Packaging. https://www.nspackaging.com/analysis/best-recycling-countries/

Plastics Litigation Tracker. (n.d.). Plasticslitigationtracker.org. Retrieved April 12, 2023, from https://plasticslitigationtracker.org/

Pyper, J. (2011, August 26). *Does burning garbage to produce electricity make sense?* Scientific American. Retrieved April 4, 2023, from https://www.scientificamerican.com/article/does-burning-garbage-to-produce-energy-make-sense/

Recycling Product News Staff August 18, Staff, R. P. N., & 18, A. (2022, August 18). *Survey finds younger generation least confident about recycling*. Recycling Product News. Retrieved March 23, 2023, from https://www.recyclingproductnews.com/article/39030/ds-smith-survey-finds-younger-generations-least-confident-about-recycling

Recycling Service Changes | Davie, FL. (n.d.). Www.davie-Fl.gov. Retrieved April 12, 2023, from https://www.davie-fl.gov/1494/Recycling-Service-Changes

Residential Recycling- Frequently Asked Questions | City of Fort Lauderdale, FL. (n.d.). Gyr.fortlauderdale.gov. Retrieved April 12, 2023, from https://gyr.fortlauderdale.gov/greener-government/recycling-waste-reduction/recycling-in-fort-lauderdale/curbside-residential-recycling/recycling-faqs

Science History Institute. (2019, November 20). *History and future of plastics*. ScienceHistory.Org. Retrieved April 6, 2023, from https://www.sciencehistory.org/the-history-and-future-of-plastics

SciShow. (2021, March 10). *The greenest grocery bag*. YouTube. Retrieved March 23, 2023, from https://www.youtube.com/watch?v=JvzvM9tf5s0

United States Environmental Protection Agency. (2022, July 6). *Summary of the clean water act*. US EPA. https://www.epa.gov/laws-regulations/summary-clean-water-act

US EPA, O. (n.d.). *EPA History (1970-1985)*. Www.epa.gov. https://www.epa.gov/archive/epa/aboutepa/epa-history-1970-1985.html

Verma, R., Vinoda, K. S., Papireddy, M., & Gowda, A. N. S. (2016). Toxic pollutants from plastic waste- A Review. *Procedia Environmental Sciences*, *35*, 701–708. https://doi.org/10.1016/j.proenv.2016.07.069

"Waste." *American University*, https://www.american.edu/about/sustainability/campus-greening/waste.cfm.