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## Abstract

Plastic pollution has emerged as one of the most pressing environmental challenges of the 21st century, threatening both marine ecosystems and human health. This study investigates the pervasive dangers of microplastics in oceanic environments and evaluates pathways toward mitigation. Drawing on interdisciplinary evidence from marine biology, toxicology, and environmental policy, the research highlights how microplastics infiltrate food chains beginning with plankton, disrupt reproductive cycles in species such as petrels and sea turtles, and contribute to mortality among endangered dolphins. Parallel findings in human health reveal microplastics present in shellfish, placenta, and breastmilk, raising concerns about long-term toxicological impacts on organ systems and developmental processes. Beyond documenting ecological and biomedical risks, this work emphasizes the urgency of systemic change. Case studies of global initiatives—including the Break Free From Plastic Pollution Act and brand audits identifying major corporate polluters—illustrate the need for coordinated legislative and corporate accountability. Finally, the study explores viable alternatives such as bamboo, seaweed polymers, and bagasse, demonstrating the feasibility of transitioning toward sustainable materials. By integrating scientific evidence with policy and community action, this research underscores that reducing plastic consumption is both a collective responsibility and a critical step toward safeguarding planetary and human health.

## Introduction

Plastic is a major part of our lives, but as the production of plastic continues, it poses an increasing risk to our environment and our health. Plastic has been filling our oceans and infiltrating food chains. Overfishing and hunting were once the primary causes of species nearing extinction, but today, plastic pollution may be the most significant emerging threat. Microplastics have been discovered in the stomachs of numerous marine organisms, often leading to their death.

Thousands of microplastics have been found in our bodies from foods such as shellfish, posing risks such as cancer, heart disease, and reproductive issues. This investigative essay aims not only to raise awareness but to emphasize that the threat is real and urgent. While scientists can present the facts, it is up to us—individuals and communities—to act. Reducing plastic consumption is a shared responsibility, and change begins with each of us caring about where our plastic ends up and what it's doing to the world we all share.

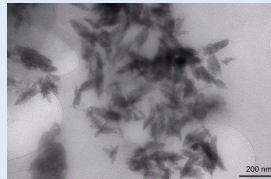


## Hypotheses

- If we found plastic replacements, can we reduce the microplastics found in our bodies?
- If these new replacements were made, would they be safe for our environment?

## Risks

- Microplastics pose major harm to several different organs in the human body. An example, microplastics can affect the forebrain organoids, having toxic effects: “PS can lead to adverse effects on the development of embryonic brain-like tissue; contrary to short-term exposure, long-term PS exposure reduces cell viability(Li et al.)”
- Microplastics can have an impact on human lungs and the progression of lung cancer. “Analyses have shown that healthy lung epithelial cells, such as BEAS-2B, are more susceptible to the negative impact of microplastics than A549 lung cancer cells. This suggests that MPs promote the induction of cancer formation rather than its progression (Sychowski et al).”



## Replacements

- Bamboo-“The team also offers bamboo-based preservative paper, eco-friendly bags, and a liquid agricultural film that accelerates decomposition while reducing soil pollution (Setting Bamboo Alternatives as the New Plastic).”
- Seaweed- “Innovators develop seaweed-based alternatives to plastic food wrappers,” author Jewel S. Cabrera quotes Zhongfan Jia, lead researcher from the Flinders Institute for Nanoscale Science and Technology. “So, for this polymer, because they have a very similar structure to craft paper, therefore, potentially, there is no problem for this to be recycled to make new paper(Cabrera).”
- Bagasse- “Per- and polyfluoroalkyl substances (PFAS) are a group of human-made chemicals commonly found in food packaging materials. Specialists link these chemicals to health risks such as cancer, liver damage, and infertility. PFAS chemicals are able to resist water and grease, making them ideal for food packaging. But when it comes to bagasse, containers don’t need PFAS to keep the material durable (Dew).”



## Discussion/Conclusion

One of the best ways to advance the removal of plastic is to push the cause through legislation. For example, the Break Free From Plastic Pollution Act, introduced in 2021, aims to drive systemic change through policy. As the organization states, “Break Free From Plastic members and allies have dedicated countless hours and efforts to policy work. To achieve systemic change, we need the support of governments and policy-making bodies.” This global movement brings together people from around the world to find alternatives to plastic and hold corporations accountable. If we stop buying plastic from major companies, it can help to push them to use more environmentally friendly resources for their products.

There is already so much plastic in our oceans, but we can make a change. The evidence shows that microplastics pose a threat to the ocean and human health. The reduction of using just one plastic bottle, making the effort to place it in a recycling bin, and much more are a great starting point. Many fear that inhalation of smoke could cause cancer, but as of 2023, studies suggest a direct link between plastic inhalation and respiratory diseases in the lungs of cancer patients. If you wouldn’t eat the plastic fish pulled out of the water, so don’t let it end up on your plate.

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