

KOHIMA COLLEGE, KOHIMA



PROJECT WORK ON ENVIRONMENTAL SCIENCE

Topic: The genesis of plastics. Methods to reduce using plastics articles.



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INTRODUCTION

Before the widespread use of plastic, daily life looked quite different. People relied on natural materials and resources for their everyday needs, finding innovative ways to meet their requirements without the convenience and prevalence of plastic products. From household items to packaging, everything was made from materials such as wood, metal, glass, and paper. In a world without plastic, people had a deeper connection with the products they used. Each item had a story and a purpose, and there was a greater appreciation for their longevity and sustainability. For example, instead of disposable plastic water bottles, people would carry reusable containers made of metal or glass. These containers were not only practical but also had a sense of craftsmanship and durability.

Packaging was also drastically different before the advent of plastic. Instead of the plastic bags and containers that dominate today's market, products were packaged in materials like paper, cloth, or woven baskets. These materials were biodegradable and easily recycled or repurposed. People had to be more creative in their storage and transportation methods, using materials that were readily available and sustainable.

In addition to consumer products, the manufacturing industry relied on alternative materials. For example, textiles were primarily made from natural fibres like cotton, silk, or wool. These materials offered breathability, comfort, and durability, unlike the synthetic fabrics prevalent today. Furniture and household goods were typically crafted from wood, giving each piece a unique and organic feel.

Life before plastic also required a greater emphasis on resourcefulness and environmental consciousness. With limited resources, people practiced recycling and reusing as a way to make the most of what they had. For instance, old clothes were often repurposed into rags or quilts, and glass jars were reused for storage or preserving food. There was a sense of responsibility towards the environment, as people understood the finite nature of natural resources.

However, life without plastic also came with its challenges. The durability and versatility of plastic have undoubtedly made certain aspects of modern life more convenient. Plastic's lightweight nature and resistance to moisture have made it ideal for packaging and transportation. Its low cost and malleability have revolutionized industries such as healthcare, technology, and construction. Plastic has also played a crucial role in improving hygiene and food safety. Nevertheless, reflecting on life before plastic reminds us of the importance of sustainability and the need to find alternatives to single-use plastics. It encourages us to reconsider our consumption patterns and search for more eco-friendly materials and practices. By learning from the past, we can strive for a future where we minimize our dependence on plastic and prioritise the well-being of our planet.

What are Plastics?

Plastics are man-made materials that have malleable properties, mostly made of hydrocarbons and are extracted from non-renewable resources such as crude oil, natural gas, and coal. Plastics are polymers that can be recycled, colored, reused, and reshaped. There are two main types of plastics:

1. Thermoplastic: These plastics can never be softened on heating and harden again on cooling after acquiring the shape. Some examples are PVC (polyvinyl chloride), PE (polyethylene), and PTFE (polytetrafluoroethylene).
2. Thermoset: These plastics can never be softened again once they are moulded. Some examples are UP (unsaturated polyester), EP (epoxide), and PF (phenol formaldehyde).

The Origin of Plastics

During the 19th and 20th centuries, games like billiards and snooker balls were made of wood, stone, bones, etc., which did not last long. Later, the balls were made of ivory obtained from elephant tusks. The game company was running out of ivory due to the excessive hunting of elephants for their teeth. This led to an announcement of a \$10,000 prize for anyone who could find an alternative to ivory by the New York Firm. In 1863, John Wesley Hyatt began researching and in 1869, he invented the first synthetic polymer called celluloid, made from cellulose. Although others before him also contributed to the creation of synthetic polymers, celluloid was flammable and light in weight, which did not fit well for the snooker ball. A new and better version was made in 1907 by Leo Baekeland called Bakelite, made from phenol and formaldehyde. This earned him the title “Father of Plastics.” This material was seen as the “Material of a Thousand Uses” due to its low price and ability to replicate expensive products or things. In the 1920s, polystyrene plastics were invented by Carl Edward Johansson, and another type of plastic called vinyl became industrialized. Then, in 1928, acrylic plastic, similar to glass, was commercialized with the help of many chemists, and in the following two years, Nylon fibre was created by Wallace Hume Carothers, replacing traditional ropes and threads. Finally, in 1933, polyethylene plastic was invented by Eric Fawcett and Reginald Gibson, which became widely used in the world. Generally, when people say ‘plastic waste,’ they are referring to this polyethylene plastic, though we have other types of plastics contributing to the plastic trash.

During World War 2, the demand for plastic grew enormously. Plastic production in the USA raised by 300% as they needed plastics to make helmets, airplane cockpit glass, water-resistant raincoats, and other war equipment. After the war, the production of plastics continued to rise as it shifted its focus to commercial goods like toys, packaging, chairs, paints, carry bags, bottles, containers, etc. Plastics were cheap and economically friendly but ecologically hazardous, which is realized by today's generation. However, it is still difficult to live without plastic due to the lack of convenient alternatives.

Why We Should Reduce Plastic

We often wonder how a product with such efforts of chemists from the 19th century to the 20th century and with such convenient uses and economic-friendly properties can be a problem. It all comes down to one of the many properties of plastics, i.e., non-biodegradability. This makes plastic dangerous for the ecosystem, and slowly, other ill effects were found. If you burn plastic, it generates harmful gases. If you bury it, it will take 20 to 500 years to decompose. If we dump it, it will remain for 20 to 500 years, making the landscape dirty.

According to a 2017 study titled "Production, Use, and Fate of All Plastic Ever Made," it estimates that 8.3 billion tons of plastics have been manufactured since the 1950s. Out of which, 6.3 billion tons are waste, lingering around the world. It's incredible that plastics are not just roaming around the world, but they are even in space, currently at a distance of 24.4 billion kilometers and have been living in space for more than 46 years inside the Voyager 1 satellite. The Voyager 1 plastic is a polyimide, which falls under number 7 of the plastic types and is a thermoset plastic. So, with that, plastics are also in the orbit of the Earth, Mars, and other space objects. Many of Earth's satellites are now non-operational and are just junk. Just as we have "space junk," we have "plastic junk" orbiting around the Earth.

The plastics also threaten animal health as plastics are more famous than celebrities in the world as they are found almost everywhere. Plastics can sometimes end up in the animal's body, leading to the direct death of the animal. The fact that plastics contain hazardous chemicals and the production of plastics also creates a lot of pollution. This can harm living creatures, the environment, biodiversity, and the ecosystem. Therefore, we should reduce the use of plastics or at least find good ways of dumping, decomposing, or using alternatives to plastics that are less harmful to the environment.

Methods to reduce the use of plastics articles.

There are several ways to reduce the use of plastics articles. Here are some methods.

1. **Government interventions:** Government can play important role in tackling this plastic issue. European have signed agreement to ban single use plastic such as plastics straw from 2030 and India have also practicing it since 2022. Such similar efforts by the government and huge company can have great and immediate outcome.
2. **Individual efforts:** Individual should be aware of the plastic and it's ill effects. Therefore, individual should restraint oneself from unnecessary use of plastics and use alternative of plastics whenever possible and most importantly should not throw plastics random places.
3. **Role of science:** we should find alternative of plastics or biodegradable plastics and ways to decompose them. Some sources says that, some mushroom can decompose plastics and also that other biodegradable plastics are available.
4. **Use reusable bags:** Instead of using single-use plastic bags, opt for reusable bags made of fabric or other durable materials.
5. **Say no to single use plastic:** When ordering drinks, request no plastic straws or use alternatives like metal or bamboo straws. Avoid plastic ear buds and plastic bags that is use once and throw.
6. **Use refillable water bottles:** Carry a refillable water bottle instead of buying bottled water. This reduces the use of single-use plastic bottles.
7. **Avoid disposable cutlery:** Carry your own reusable cutlery when eating out or opt for restaurants that use biodegradable or compostable utensils.
8. **Choose glass or metal containers:** Store food and beverages in glass or metal containers instead of plastic containers.
9. **Buy in bulk:** Purchase products in bulk to reduce packaging waste. Bring your own containers to refill items like grains, nuts, and spices.
10. **Choose eco-friendly packaging:** Look for products with minimal packaging or packaging made from recycled or biodegradable materials as most of the plastic waste comes from packaging.
11. **Recycle and dispose of properly:** Ensure that you recycle plastic items correctly and dispose of them in designated recycling bins. This helps reduce plastic waste in landfills and oceans. There even labels on most plastic products from number 1 to 7 for easier recycling and identifying the types of plastics.

12. Support plastic-free initiatives: Encourage businesses and organizations to reduce their use of plastic by supporting plastic-free initiatives and spreading awareness.

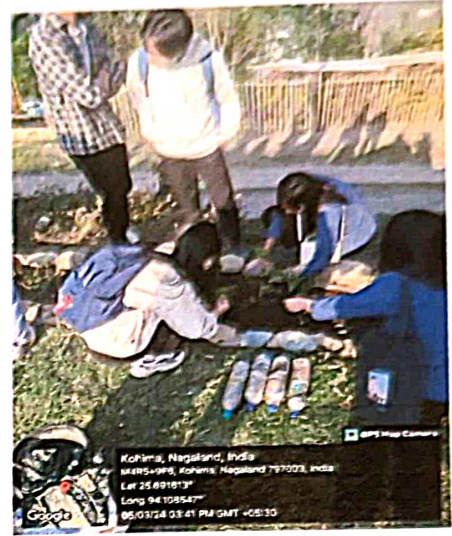
13. Educational activities: More activities should be encourage and consider to save nature. The activities that we are conducting should be more emphasis and applied in other educational institutions.

14. Educate others: Share information about the harmful effects of plastic pollution and the importance of reducing plastic use with friends, family, and colleagues.

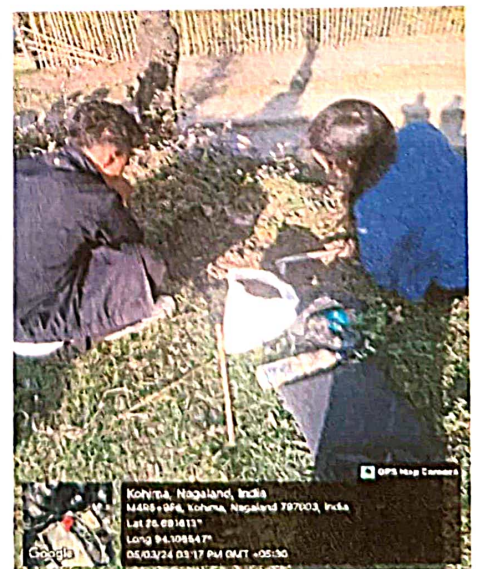
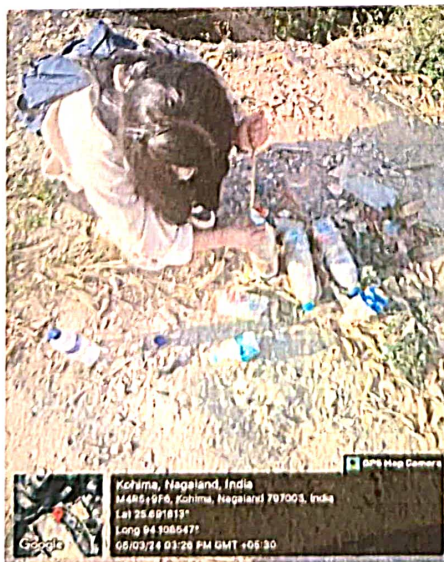
By following above mentioned methods into our daily lives, we can make a significant impact in reducing the use of plastic articles and contribute to a more sustainable future and cleaner, greener earth. It is very important to take action from now not tomorrow because tomorrow we don't know what will happen.

Group experience and the activities.

With the group activities contacted on 5th March, 2024. Our group witness the wide spread plastic trash and it's degrading environment aesthetic beauty. We found various types of plastics thrown around everywhere and mostly it was packaging plastics and water bottles. Cleaning the trash was not easy and required extra material like gloves, dust pin, energy etc. This lead us wonder, what if individual have thrown the plastic in thier respective pins then so much time, energy and materials would have



saved. Our group made four eco-bricks but we believe, the area had enough of plastics trashes to make another hundreds of eco-bricks. Some group members brought cow dung manure, some brought shrubs and some tools needed for the planting, cleaning and making eco-brick. We all work on it and planted some shrubs and we hope that will atleast help the nature. The shrubs will take years to grow but we, human beings cuts it down in a matter of minutes and it one of the most sad things to observe. We hope with such activities and discussion, individual will realized the impact of plastic and participate in more environmental protection activities. We hope individual will become a responsible consumer, who will use resources wisely, dump and throw plastic in was that has no or less bad effects of plastic on environment.



Conclusion:

After engaging in discussions, conducting research, and observing, we are immensely grateful to the lecturer who provided us with this activity and the opportunity to learn and contribute to the preservation of nature. Our group has gained valuable insights about the fascinating origins of plastic, which turned out to be quite different from our initial expectations. We were surprised to discover that plastic originated from a game interest. Additionally, we have learned about the various types of plastic and their identification numbering.

This assignment has significantly expanded our understanding of plastic and its true significance. While many people associate plastic mainly with polythene bags and standard plastic containers, we now recognize that plastic is present in a multitude of forms, ranging from transparent glass-like materials to paints, raincoats, and even strong fibers like Nylon.

We strongly believe that similar group activities should be organized in every institution, regardless of the subject, as these small steps can have a great impact. Through this simple group activity, we have gained a wealth of knowledge about plastics, why they were created, and how they have become so widespread. It has not only educated us but also raised our awareness, and we hope that each individual member will continue to spread this awareness and contribute to making the Earth greener and cleaner.

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