

How to Minimize Plastic Waste in Sri Lanka

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Abstract— Plastic could be called a miracle material that saves countless lives health sector, the growth of clean energies such as wind turbines and solar panels has been immensely facilitated, and safe food storage has been modernized. Even though everything that is born from the mother nature, should return to mother nature and contribute to new life. This cycle is the pathway to healthy ecosystems and a healthy world. When our world is in balance, everything around us is naturally healthy. With plastics, that cycle is broken currently.

Index Terms— Bamboo Straws, Circular Economy, Polyethylene Plastic, Single Use Plastic.

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1. INTRODUCTION

We make plastic, we use it for mostly only a few seconds, and then we throw it away. The majority of the plastic we produce, consume, and waste ends up in our environment, causing harm to our beloved ecosystems, and to ourselves. Even a tiny **piece of plastic ever made still exists, in some form of waste, on our planet earth**. According to “USA Today” in 2019, Sri Lanka is in the 5th place in the list of countries contributing to Ocean Plastic [1]. Therefore, In this research, I focus on the plastic manufacturing in Sri Lanka, its generations, and few solutions I have implemented and suggestions for all to make Sri Lanka produce a gram less of plastic than which was produced yesterday. Also, this research includes a survey conducted on “Plastic waste in Sri Lanka” within the University students of Sri Lanka.

2. HOW TO MINIMIZE PLASTIC IN SRI LANKA

“Plastic Waste” has received a unique place in Sri Lanka. Even though none of the individuals are willing to contribute to finding a solution, everyone demanding proper disposal mechanism, in other words, “Plastic waste” is “somebody’s responsibility” other than the persons who are responsible for generating it. To get a broader understanding of the seriousness of this problem, let’s take a look at a few stats of the world.

2.1 Alarming Stats about plastic in the world [2]

- About 1 trillion single-use plastic bags are used annually across the globe. That’s nearly 34,000 every second.
- It is estimated that 1.15 to 2.41 million tons of plastics enter the ocean each year from rivers
- More than half a billion plastic straws are used every day around the world.
- The world uses 500 billion plastic cups every year
- 16 billion disposable coffee cups are used each year. These are coated with plastic to laminate the inside and use plastic lids
- The world produces more than 14 million tons of polystyrene (plastic foam) each year

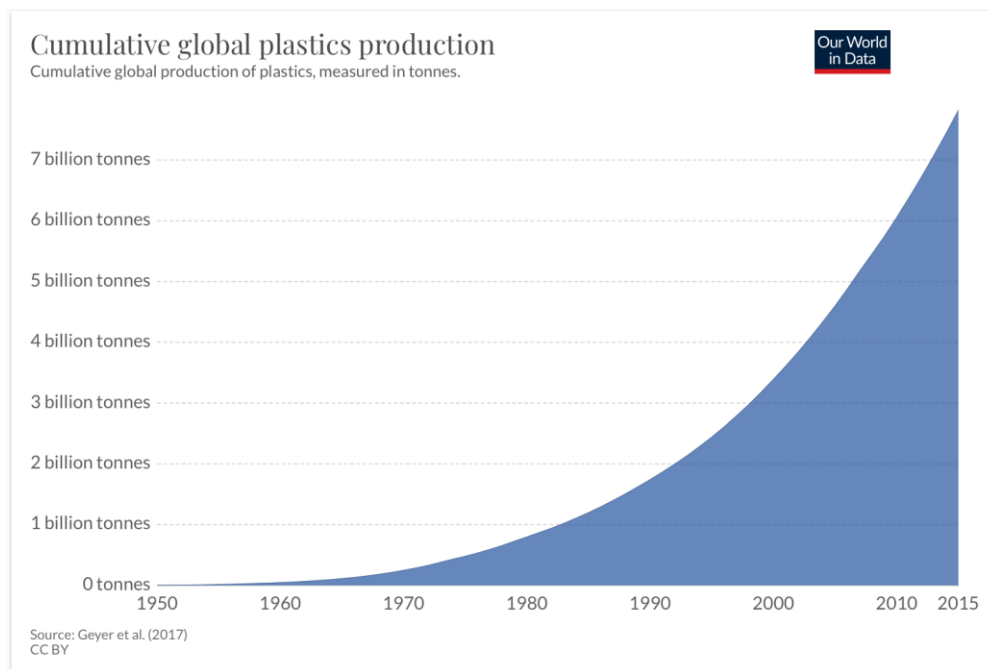


Fig. 1. Cumulative global plastic production [2]

Fig. 1 shows that by 2015, the world had produced 7.8 billion tons of plastic, more than one tone of plastic for every person alive today [2]. That means 7800 million metric tons (Mt) as of virgin plastics have been produced as of 2015. However, around 9% of which had been recycled, 12% was incinerated, and 79% was accumulated in landfills or the natural environment based on the available facts.

If a miracle happens and the whole world decides to stop producing plastic, it would take approximately 1000 years for the current plastic polluting our planet to be decomposed and wiped out from our planet. That means for about another 40 generations, the issue of plastic will last. Plastic waste will be such a serious problem not only for our generation but to the generations who haven't even been born yet. As we all know, plastic waste is one of the major issues in the modern world as well as in Sri Lanka. The government, NGOs, and the youth of the country are equally trying to find proper solutions to this catastrophic issue. In this proposal, I present to you the facts that I found, a survey that was conducted about what youth thinks about Plastic waste and Eco-friendly solutions, and a few suggestions that I have been trying to implement myself over the past year.

When addressing solutions for plastic waste, the "attitudes of people" is what we need to change first in the Sri Lankans. They think plastic waste is the municipal council's responsibility or of the manufacturers of that plastic. I think first, by changing the attitudes of the people, we can start to impact on minimizing plastic waste in Sri Lanka. By 2015, Sri Lanka had produced 141 million plastic products [3]. Only 2% of this produced plastic is recycled, which means close to 138 million plastic products are out there, and many of those plastics could be polluting our lands and ecosystems.

3. TYPES OF PLASTIC WASTE

The types of plastic waste are numerous in types and categories, but let's take a look at the major contributors to the pollution in Sri Lanka. The top plastic pollutant is the single-use plastic bottles, also known as PET (Polyethylene Terephthalate) bottles, which many of the soft drinks and water bottles come in. Due to the

irresponsible consumption of the user, these bottles go into drainages and block the water draining systems, which cause flooding. For this type of bottle to decay, it takes approximately 450 years [4].

One plastic waste which we are not even aware that it is plastic is “Cigarette Butts” Most people think its cotton and they throw it away after usage. Even in movies and TV series, they show the actors are smoking before a big fight or as a stress-relieving activity, but those movies never show the proper ways of disposing of those Cigarette Butts. Even though we all know Cigarettes are bad for our health, only a small number of people know that it is harmful to the environment too. The butt of a cigarette is primarily the filter, made of a type of plasticized cellulose acetate. It does not readily biodegrade and takes more than ten years to degrade [4]. According to the Ocean Conservancy’s 33rd annual International Coastal Cleanup day in 2017, Cigarette Butts was the first and foremost plastic item predominantly found in the ocean and inside fish up to date. Fig. 2 shows the top ten items collected in the International Coastal Cleanup day in 2017.



Fig. 2. Top ten items collected in International Coastal Cleanup day in 2017

4. DANGERS TO EVERYONE

Great Pacific Garbage Patch is the most extensive ocean plastic garbage collection, which accounts for the 1.6 million square kilometers of surface area. Approximately 80,000 metric tons [5]. Plastic breaks down into smaller Micro-Plastics and even lower Nano-Plastics. There are now about 51 trillion micro-plastic particles in our earth and oceans, and that’s 500 times the stars in our galaxy [5]. Micro-plastics are the worst part of plastic pollution, which is often mistaken for food by marine animals. The millions of marine animals are dying every year with the consumption of food chains. High concentrations of plastic materials, particularly plastic bags, have been found blocking the airways and stomachs of hundreds of species.

Plastic bags are contributing for the blocking of waterways and exacerbate natural disasters, These bags go into the soil and prevent rainwater from entering into the underground waterways. Also, that the toxic chemicals added during the manufacture of plastic transfer to animal tissue, eventually entering the human food chain

which eventually cause deadly health issues. The dangers to Sri Lanka through plastic is also rising day by day due to plastic.

5. WHY AREN'T THERE MANY PLASTIC RECYCLERS

Plastic recycling is a more expensive process than to make plastic from scratch from fossil fuels, such as oil. This encourages the industries to continue plastic manufacturing instead of recycling used plastic. At the same time, it is not available enough recycling infrastructure in place to deal with all of the plastic waste we create. If we do not find a solution for this, there would be 1 tone of plastic in sea per 3 tons of fish in our oceans. That is alarming because most humans and animals consume seafood as their food intake and this micro-plastic could get into our bodies easily.

6. POSSIBILITIES TO MINIMIZE

It has been a high priority topic over the years to find various ways to reduce plastic. The best solution is to stop producing plastic altogether. If you walk into a room and see a sink is overflowing due to an open tap, what would we do? Is collecting the overflowing water using a bucket and throwing it out sustainable? Or closing the tap?. Of course, the best solution is to close the tap first and then throw away the overflowed water. The solution for plastic waste should also be like that. No matter how many beach clean-ups we do if the manufacturers keep producing plastic, the environment will keep accumulating plastic. But if we stop manufacturing plastic once and for all, that would be the ideal way to end this massive crisis, but we can't stop plastic production just like that. Many industries, multinational companies depend on this miracle but dangerous material. Therefore the best way is to come up with alternative solutions for every use of plastic first and then stopping the production of plastic. In 2017 the government banned the use of Polythene in Sri Lanka. It was not successful because there were no alternatives introduced to use instead of polythene. The businesses and people started to protest, and things went back to how they were before. Therefore, to make this transition successful, it has to become up with feasible alternatives first and then bans the production of plastic.

One method I suggest is to introduce an Electronic PET collecting bins (Fig. 3 and Fig. 4) in the universities of Sri Lanka, this will get the youth of the country involved in plastic recycling, and after the pilot projects, this method could be implemented in other public places as well. By this method, the PET bottles that are brought to the universities through events and concerts will be recycled effectively. Introducing a rewards and recognition method would encourage university students to collect more plastic bottles. That method is to install an electronic device in the PET collecting bin, which recognizes the students when they swipe their university ID card. Furthermore, the machine will count how many bottles the student is feeding the machine. At the end of the time of the student's university life, the university will issue a letter stating how much the student contributed to the betterment of society through PET recycling. I believe that this implementation will help the students to be motivated to contribute to society. The same technology could be made by the public by making the electronic device recognize ID cards of schools or offices, and a website could also be created to show a leader board and to share plastic waste related articles.

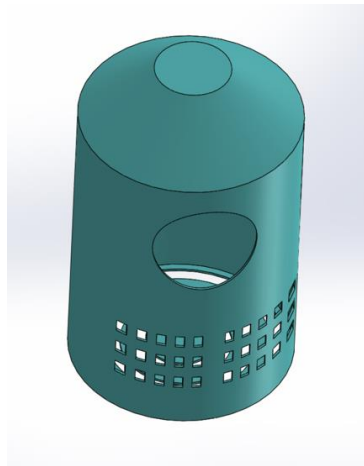


Fig. 3. Electronic PET Collector (Orthographic Projection)

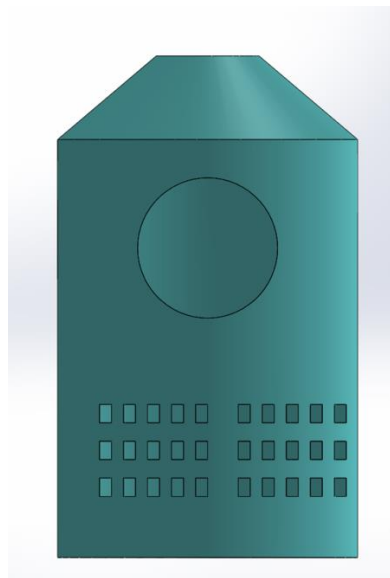


Fig. 4. Electronic PET Collector (Front Elevation)

The second suggestion is the method against plastic straws. As previously indicated in Fig. 2, plastic straws are the 5th major ocean plastic contributor, and a single straw takes about 200 years to decompose. Currently, in Sri Lanka, plastic straws are used in millions daily. I conducted a survey in the fresh juice shop near Wijerama, Sri Lanka where many university students consume their daily nutritious drinks, and the results were alarming, the shop throws away 300 plastic straws (on average) per day. If the juice shop to be open for 250 days of the year, that is 75000 straws per year. The suggestion is to encourage people to use a personal Bamboo straw. So if a person buys a bamboo, he could use it daily and refuse plastic straws offered by the restaurants, hotels, university shops, and school shops. Fig. 5. shows a bamboo straw and a brush that could be used to clean the straw daily, and if a proper packaging could be introduced to package these two items it would make the use of the straw more practical and portable. The bamboo straw mentioned here could be reused up to 6 months, which could significantly cut down the plastic straw pollutants in Sri Lanka significantly.



Fig. 5. Bamboo straw and a cleaning Brush

7. A METHOD FOR SRI LANKA

A method that Sri Lanka can learn from the European Union is to create a Circular Plastic economy. The circular economy, simply it is an alternative, more sustainable model to the traditional linear economy, which follows the path of “make, use, then dispose of.” In a circular economy, resources are used for as long as possible, as well as extract the maximum value whilst in use. Then, at the end of their operating life, recover and regenerate products and materials [6]. Fig. 6 shows the steps of the circular economy.

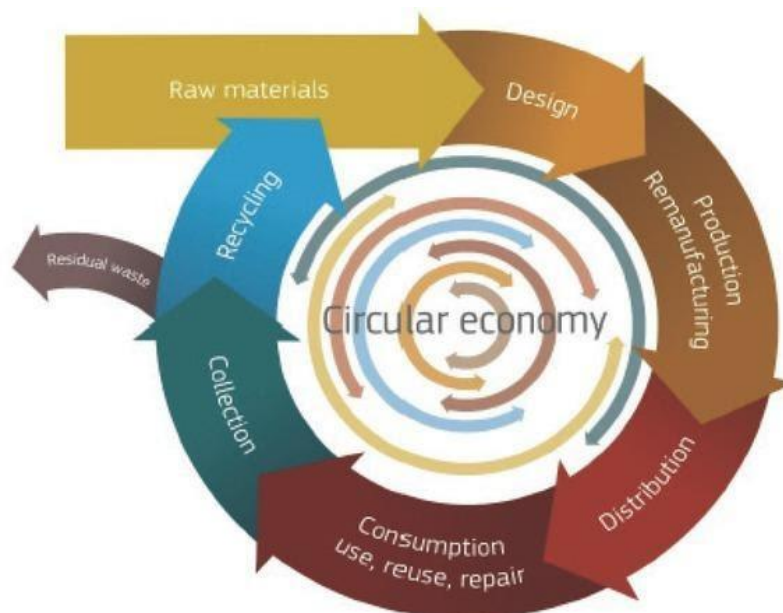


Fig. 6. Steps of the Circular Economy [6]

By implementing Circular Plastic Economy, it will drive Sri Lanka to improve competitiveness within the organizations to “Reduce, Reuse and finally Recycle” plastic, which would lead to resource efficiency.

8. CONCLUSION

Plastic saves food wastage when the packaging of food, helps to produce lightweight transport containers and helps massively in the energy sector, but this miracle material comes with many disadvantages to both Man, Animals and Earth. From natural disasters such as floods to Cancers in Human cells, plastic has played a terrifying role. In Sri Lanka, the Government, Youth Organizations, Non-Governmental Organizations have tried hard to find a solution to this monstrous problem. The future of Plastic Minimization in Sri Lanka is hopeful when taking a look at the increased discussion among the youth about the sustainable development goals and achieving them. Let's get together to work for a Plastic Free Sri Lanka.

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REFERENCE

- [1] D. Rice. USA TODAY: Where did the trash from great pacific come and how to stop it. (September 7th ,2018)
- [2] Environmental Protection and Natural Resources. The Journal of Institute of Environmental Protection- National Research Institute, 2014.
- [3] <http://www.cea.lk/web/images/pdf/Guidelines-on-solid-waste-management.pdf> . Accessed 20.11.2019
- [4] http://storage.neic.org/event/docs/1129/how_long_does_it_take_garbage_to_decompose.pdf Accessed 30.11.2019
- [5] R. Geyer, J.R. Jambeck, & K.L. Law, Production, use, and fate of all plastics ever made. Science Advances, 3(7), e1700782, 2017.
- [6] UNEP. SINGLE-USE PLASTICS: A Roadmap for Sustainability, 2018.