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PLASTIC POLLUTION

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Abstract:
Context Materials which exceed the balance of their production and destruction lead to the deterioration in the environment. Plastic is one such material which poses a big threat to the environment. A huge amount of plastic is produced and dumped into the environment which does not readily degrade naturally. In this paper, we address the organization of a large body of literature published on the management of waste plastics being the most challenging issue of the modern world. Objectives to address the issue of the management of waste plastics, there is a dire need to organise the literature published in this field. This paper presents a systematic literature review on plastic waste, its fate and biodegradation in the environment. The objective is to make conclusions on possible practical techniques to lessen the effects of plastic waste on the environment. Method Asystematic literature review protocol was followed for conducting the present study Kitchenham B, Brereton OP, Budgen D, Turner
M, Bailey J, Linkman S. Systematic literature reviews in software engineering A systematic literature review. Inf Softw Technol 2009. A predefined set of book sections, conference proceedings and high-quality journal publications during the years 1999 to September 2017 were used for data collection. Results One hundred and fifty-three primary studies are selected, based on predefined exclusion, inclusion and quality criteria. These studies will help to identify the fate of different waste plastics, their impact and management and the disposal techniques frequently used. The study also identifies a number of significant techniques and measures for the conversion of waste plastic materials into useful products. Conclusion Five fundamental strategies are used for the handling of plastic waste. These strategies include: recycling, depositing in landfill, incineration, microbial degradation and conversion into useful materials. All of these methods have their own limitations, due to which there is a need to explore the studies for optimum solutions of the management of plastics waste.

Key word: Plastic pollution, Micro-plastics, Environment, Bio-plastics, Waste management, NGOs, Biodegradable, Non-biodegradable, Nano plastics

Introduction:

Plastic pollution is the buildup of synthetic plastic items in the environment to the point where they pose a threat to both human populations and wildlife and their ecosystems. Due to the introduction of genuinely synthetic plastic resins into global trade in 1907, the invention of Bakelite sparked a revolution in materials. Plastics were discovered to be a chronic pollutant of various environmental niches at the turn of the 20th century, from Mount Everest to the ocean's depths. Plastics have drawn more attention as a substantial pollutant, whether it is because they are mistaken for food by animals, flood low-lying areas by clogging drainage systems, or just negatively impact the environment significantly in terms of aesthetics.

Plastic is a polymeric substance, which means that it has very massive molecules that frequently resemble long chains consisting of an apparently unlimited number of interconnecting links. Although there are many natural polymers, including silk and rubber, they have not been linked to environmental contamination since they degrade quickly in the environment. Today, however, the typical consumer interacts on a daily basis with a wide range of plastic materials that have been created specifically to thwart natural decay processes. These materials, which are primarily derived from petroleum and can be cast, spun, or applied as a coating, come in a variety of shapes and sizes. Because they are essentially non-biodegradable, man-made plastics tend to linger in natural settings.

Additionally, a lot of lightweight single-use plastic items and packaging—which make up about 50% of all plastics produced—are not placed in containers to be later taken to landfills, recycling facilities, or incinerators. Instead, they are carelessly discarded at or close to the spot where they no longer serve

the needs of the consumer. They start to harm the environment as soon as they are dropped on the ground, flung out of a car window, piled atop a garbage can that is already full, or unintentionally swept off by a gust of wind. In many places of the world, plastic packaging has become a common hazard in the landscape. (Illegal plastic waste disposal and overflowing containment structures also contribute.)

Objectives:

The objectives of this study includes the following:

1. To cover the problems that plastic pollution has caused in the environment.
2. To discuss the viewpoint of common people towards plastic pollution and their efforts to fight against it.
3. To analyze the programs that the Government and NGOs took to control plastic pollution.

Data analysis:

Question 1. Are you aware of plastic pollution and the impact it has on the environment?

In this question, all 20 responders have answered that they were all aware of plastic pollution and its harmful effects on the environment. This shows that the current problems we have with plastic pollution is not because of people being unaware but rather because of less action being taken up and lack of effort.

Question 2. Why do you think plastics are very common?

In this question, we got one person each for those who think plastics are common because they are cheap, light weight, readily available and lack of alternative materials. 15 people choose all the above options.

Question 3. Where do you think plastic go after you disposed it?

In this question, 50% of the total respondents think plastics are dumped in rivers and seas after it is used, 11% think they are burnt down and 38.9% think that plastics end up in landfill.

Question 4: Do you think we can recycle plastic?

In this question, 50% of the total respondents think plastics can be recycled after it is used, 39.9% think plastics can't be recycled and 11.1% are not sure about the answer.

Note: In principle, almost all plastics can be recycled. However, in practice, there are a variety of different barriers that can undermine this process. Unfortunately, it does not always make environmental, economic, or technical sense to do so.

Examples of non-recyclable plastics include bio-plastics, composite plastic, plastic-coated wrapping paper and polycarbonate. Well known non-recyclable plastics include cling film and blister packaging. Scientists have figured out a way to recycle plastic hundreds of times without losing the quality of the material. Currently, most plastics can only be recycled two or three times before the quality degrades so much that it becomes unusable.

Question 5. What happens to the plastic waste around the area where you live in?

In this question, 44.4% of our respondents say that plastic waste is scattered around and it is not maintained properly, 16.7% say that the plastic waste is reused/recycled and 38.9% say that it is well maintained and disposed properly. Here we can see that the majority of our respondents complain about plastic waste not being maintained properly.

Note: Only about 9 per cent of the total plastic produced globally gets recycled, about 12 per cent is incinerated and energy is recovered, and the rest — about 79 per cent — gets into land, water, and ocean and pollutes the environment.

From 1950 to 2015, around 8.3 billion metric tons (BMTs) of plastic had been produced globally, and of this, 80 per cent – 6.3 BMTs – was accounted as plastic waste.

Question 6. How many plastic bottles do you buy per week?

In this question, 50% of our respondents say that they buy 1-3 plastic bottles per week and 40% of them buy none at all. The rest are not sure about their numbers.

Note: As per the industry data, more than 14 lakh tons of PET plastic are consumed annually in India, and even with a global highest 80% recycling rate, approx. 2.8lakh tons of plastic bottles waste never

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gets collected. Studies show that people around the world buy a total of one million plastic bottles per minute. That's almost 1.5 billion plastic bottles per day

Americans purchase about 50 billion water bottles per year, averaging about 13 bottles per month for every person in the U.S.! That means by using a reusable water bottle, we could save an average of 156 plastic bottles annually. Five trillion plastic bags are produced worldwide annually.

Around 380 million metric tons of plastic are being produced yearly.[1] 8.3 BILLION Metric Tons (9.1 BILLION US Tons) of plastic has been produced since plastic was introduced in the 1950s. The amount of plastic produced in a year is roughly the same as the entire weight of humanity.

Question 7.After you have finished using the plastic what do you do with it?

In this question, 77% of the people say that they throw their plastic waste in the dustbin after they are done using, 16% reuse their plastic products and the remaining recycle it.

Question 8.Do you think charging a price for plastic bags in shops is a good idea?

In this question, 58.8% of the people think that it is a good idea to charge a price for plastic bags in shops while 17.6% of the people disagree with the idea. The remaining 23.5% are not sure about the idea.

Question 9.Do you help at all in reducing the plastic pollution?

In this question, 55% of our total respondents claim to have helped a lot in reducing plastic pollution while 30% of the people say that they help a little bit. 15% of the people admit that they would like to help but they don't know how to.

Note: We can do our part in fighting plastic pollution by following these tips:

1. Recycle when possible (and do it properly)
2. Avoid single-use plastics
3. Use alternative packaging
4. Do a trash audit
5. Find reusable options
6. Grow your own food
7. Buy from local markets and low-waste shops
8. Make your own cleaning and cosmetic products in jars
9. Switch up your laundry routine
10. Choose clothes made from sustainable or recycled materials
11. Shop in bulk
12. Stop buying water
13. Buy second-hand item

Question 10. What is your most commonly used plastic product?

In this question, 30% each of the total respondents said that their most commonly used plastic products are plastic bottles, plastic bags and packaging materials respectively. The remaining 10% use plastic disposables as their most commonly used plastic product.

Note: The single-use plastic mostly found are:

Plastic bottles and lids.
Cigarette butts.
Cotton bud sticks.
Crisp packets and sweet wrappers.
Period products.
Plastic bags.
Plastic cutlery and straws.
Coffee cups and drinks containers.

Question 11. Do you think government is doing enough for fighting plastic pollution?

In this question, 55% of the people disagree that our government is doing enough to fight plastic pollution and 38.9% of the people think that the government is doing enough to fight against it. The remaining people remain neutral.

Note: To curb the pollution caused by littered and unmanaged plastic waste, the Government of India has imposed a ban on the manufacture, import, stocking, distribution, sale, and use of identified single-use plastic items, which have low utility and high littering potential all across the country.

Norway is the world leader in recycling plastic bottles, due to its refundable deposit program. Through this system, 97% of all plastic bottles in this Scandinavian country are recycled, making Norway the highest recycling country for plastic. Of that, 92% is turned back into bottles.

Question 12. Are you aware of any government or non-government campaign to reduce plastic waste in your area?

In this question, 50% of the total respondents say that they are aware of any governmental or NGOs campaign to reduce plastic pollution while 22.2% of the people are not aware of it. 27.8% of the people remain unsure of it.

Note: Here are some of the organizations fighting against plastic pollution:

1. Precious plastic
2. Plastic Pollution Coalition
3. Clean ocean project
4. The Ocean Cleanup
5. Plastic Oceans
6. The oceans of stuff
7. Save our shores
8. Let's clean up Europe
9. Changing Markets Foundation

Question 13. Are you aware of micro-plastics and their impacts?

In this question, 66.7% of the total respondents are aware about micro-plastics and their impacts while 27.8% of the people are not aware of it.

Note: Micro-plastics are tiny plastic particles that result from both commercial product development and the breakdown of larger plastics. As a pollutant, micro-plastics can be harmful to the environment and animal health.

Seven major sources of primary micro-plastics are identified and evaluated in this report: Tires, Synthetic Textiles, Marine Coatings, Road Markings, Personal Care Products, Plastic Pellets and City Dust. In laboratory tests, micro-plastics have been shown to cause damage to human cells, including both allergic reactions and cell death. But so far there have been no epidemiologic studies documenting, in a large group of people, a connection between exposure to micro-plastics and impacts on health.

Question 14. Are you aware of the approximate amount of waste generated from your city?

In this question, 16.7% of the people are aware of the approximate amount of waste generated from their city while 38.9% have no idea. The remaining 44.4% are not sure about the amount.

Question 15. How would you rate the plastic waste management in your locality? (0- very unsatisfied, 5- very well managed)

In this question, 15% of the people rate 1, 10%-2, 40%-3, 15%-4 and 20%-5 respectively. As we can see, the majority stands neutral towards the waste management strategy of their locality while a few are strongly unsatisfied with the planning.

Question 16. On a scale of 0-5 how sever do you think n plastic pollution is to the environment

Categories	No. of individuals	Percentage

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1	2	11.1%
3	4	22.2%
4	4	22.2%
5	8	44.4%

As we can see from the graph, about half of our respondents take plastic pollution as a serious threat and they feel the need for the government to take immediate actions. 44.4% of the people think plastic pollution is a medium threat to us and 11.1% think it as less threatening. Their opinions may be based on how much exposure they had with the threat

Question 17. Suggest an alternative to plastic.

Here are the major responses we get from our survey upon asking to suggest an alternative of plastic.

Aware the people on plastic pollution and its impact
BYOP
Cloth and jute bags
Natural and organic materials
Cotton bags, paper bags, eco-friendly grow bags
Natural products
Use own bags
Paper, eco material products
Paper bags
Plastic making factories should be banned

Conclusion:

Plastic pollution is a global phenomenon that exacerbates global warming and flooding and must be mitigated to achieve environmental sustainability. While plastic pollution presents a serious environmental threat, numerous opportunities exist that can be harnessed to mitigate, manage, and control this global problem. However, our understanding of plastic pollution is incomplete and further investigation is required to fully elucidate this problem.

Plastic pollution is hazardous to the living and nonliving components of the environment. The negative impact of macro-, micro-, and nano-plastics on the environment and living organisms results from a combination of inherent characteristics and toxicity, the leaching of additives or constituent compounds, and the release of persistent adsorbed pollutants. Although studies concerning the impact of plastic matter on various ecosystems, such as soil and air, are limited, the available literature demonstrates the exigency of revisiting the entire plastic economy value chain to ensure a sustainable environment.

To meaningfully address this global challenge, the scientific community must take ownership of the environmental challenges in which it is complicit as well as a remedial action. The political will of governments, cooperation of stakeholders, and determination of the population are imperative to the success of plastic pollution mitigation. Although plastics have contributed immensely to the progress and advancement of our civilization, we must ensure that posterity inherits sustainable earth. The time for action is now.