A STUDY ON THE EFFECTS OF PLASTIC ON MARINE LIFE & ITS POSSIBLE SOLUTIONS

[1]Nirupama Shankar Babu T, [1]Sindhu P, [2]Dr. Raghu G Anand, [3]Mrs. Shilpa Mary T

[1]Student at JU-CMS, Bangalore; [2]Professor; JU-CMS, Bangalore; [3]Assistant Professor, JU-CMS, Bangalore.

ABSTRACT:

When natural degradation processes are slow and technological cleanup methods are ineffective, plastic pollution is considered "poorly reversible" in that particular ecosystem. In areas where plastic pollution has had a harmful impact, it may be nearly impossible to reverse the damage. Weakly reversible plastic pollution can result in changes to the carbon and nitrogen cycles, alterations to soil and habitat, sedimentation, and effects on aquatic ecosystems and rare or keystone species. Additionally, there are potential effects on ecotoxicity and related societal impacts. The best solution to the threat of plastic pollution is to quickly reduce environmental emissions by decreasing the use of virgin polymers and implementing globally coordinated waste management strategies.

Keywords: *Plastic Debris, Marine, GDP, Polymer, Discharge.*

INTRODUCTION:

In the past few decades, plastics have changed the way we live. Globally, we are using more than 260 million metric tons of plastic every year, which is equal to 8% of worldwide oil production. In this topic issue of Scientific Proceedings of the Royal Society, we address usage trends that are currently in place as well as those that are anticipated, as well as the myriad benefits that plastics give society. We also consider the effects that a build-up of plastic wastes could have on the ecosystem, the effects it'll have on wildlife, and the health hazards related to the manufacturing, use, and recycling of plastics. Finally, we consider several possible solutions to these problems in addition to the policy and research objectives necessary.

BACKGROUND:

Early Development

In 1869, John Wesley Hyatt developed the first synthetic polymer in response to a $10,000 reward offered by a New York company for an alternative to ivory. The increasing demand for ivory, which required killing wild elephants, was due to the popularity of billiards. By processing cellulose, derived from cotton, with camphor, Hyatt created a plastic that could be molded into various shapes and made to look like natural materials such as tortoiseshell, horns, linen, and wood. This discovery revolutionized human manufacturing, as it freed it from the limitations of nature for the first time. Previously, resources such as timber, metal, rock, bone, ivory, and horn were finite, but now anyone could create new materials. This innovation was beneficial for both the environment and humanity, and advertisements hailed celluloid as a savior for elephants and tortoises. Plastics could protect the natural environment from the destructive impact of human desire.

Present Situation

Marine plastic pollution has affected at least 267 species worldwide, with 86% of sea turtles, 44% of seabirds, and 43% of marine mammal species being affected. This pollution leads to various harmful consequences such as ingestion, malnutrition, suffocation, disease, drowning, and entanglement. It is a global crisis, with plastic buildup in our oceans and on our beaches. Huge amounts of plastic can be found in the swirling convergences that make up around 40% of the ocean's surface. If current trends continue, plastic is projected to outweigh all fish combined by 2050.

REVIEW OF LITERATURE

According to a report by (José GB Derraik, 2022) , ". A combination of legislation and the enhancement of ecological consciousness through education is likely to be the best way to solve such environmental problems."

(Saudamini Das, Prabhakar Jha, Archana Chatterjee, 2020) in their paper "Assessing marine plastic pollution in India", “maintains that inefficient waste management practices have resulted in the plastic waste either being piled up on dumpsites or finding their way into the open sea contributing to global problem of marine plastic pollution”.

Objective of the study

1. Impact of plastic on marine life.
2. Contribution of total decline in marine well-being.
3. Direct & indirect effect of plastic in water bodies.
4. Challenges to be faced for Management of plastic
5. Importance of plastic alternatives.

RESEARCH METHODOLOGY:

Descriptive Research– Research Type.

Qualitative Research Design- Research Design.

Secondary Data – Data type

Study that we went through in this research paper is descriptive research. Therefore, we have used secondary sources of data like books; internet source journals, magazines and Various reports of the government of India are used in the research. And also, for the tabulation of data we have used some of the statistical techniques and basic of mathematic techniques

Limitations of the study:

1. The study was conducted in less than a week which is a very short period of time. Therefore, we were facing a lack of enough time.
2. Due to time constraints, we were facing lack of time. Therefore, we only went through secondary data.

NEED OF PLASTIC AS A MATERIAL

Plastic is used often in daily activities, which has an impact on a number of areas including production, employment, meeting demands, and cheaper alternatives to pricey goods.

1. It has excellent preservation and protective value.
2. It has good insulation properties for heat, electricity, and sound.
3. Cost savings through improved efficiency.
4. Its features drastically cut down on energy use and greenhouse gas production.
5. Both in usage on individual basis and production.

POSITIVE IMPACTS

1. Life is preserved by plastic. Ever wonder why plastic is employed in medical equipment so frequently? Plastic allows a more hygienic environment by offering single-use goods and eliminating the need to sterilise and reuse devices. Plastic also offers a higher degree of ease compared to substitute metallic options and is hypoallergenic.

2. Because plastic is lightweight and cars use less fuel, we use fewer of our precious, finite resources. Additionally, it offers packaging options for lightweight things that are fuel-efficient. By converting plastic into fuel, it is possible to reduce the amount of fossil fuels that are extracted from the earth and to maintain low fuel costs.

3. Homes, bridges, building infrastructure, and other items are frequently made of plastic because it is a very durable and strong material. Plastic is both compact and resilient, resistant to decay and weathering, and has a good weatherability due to its ability to form tight seals. Also, this leads to homes that require less energy to heat and cool. Because it is a robust material, less trash ends up in landfills because it requires fewer equipment to be made and fewer components to be discarded due to wear and tear.

4. Plastic has the ability to be melted down and reshaped repeatedly. By recycling plastic, the demand for new materials can be reduced and the amount of waste sent to landfills can be decreased. A prime example of this is reusing water bottles, which can lead to a significant reduction in energy use, pollution, and greenhouse gas emissions

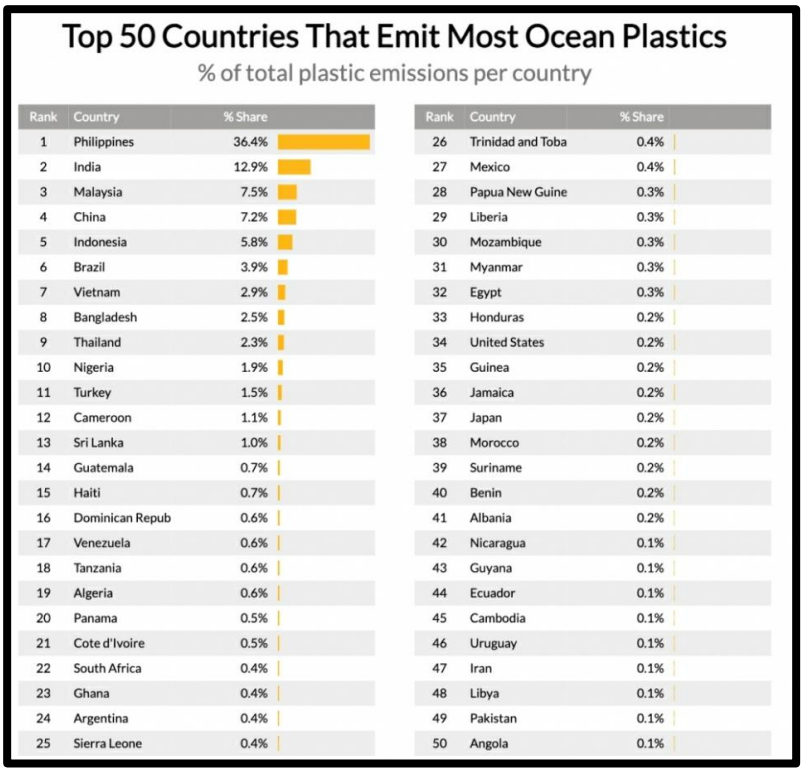
5. Plastic is a valuable resource that has aided countless discoveries and advanced modern society, yet it needs to be handled carefully. We can all help reduce trash in landfills by removing scrap during production. Along with saving you money, this reduces energy use, greenhouse gases, and plastic waste.

DATA ANALYSIS

- **Nations that Fuel the Plastics Crisis**

Some people might believe that the nations that produce or consume the most plastic also damage the waters the most. Yet, that is untrue.

According to the report, plastics are more likely to wash into the ocean from countries with smaller geographic areas, longer coasts, significant rainfall, and subpar waste management systems.



Top 50 Countries That Emit Most Ocean Plastics

% of total plastic emissions per country

Rank	Country	% Share	Rank	Country	% Share
1	Philippines	36.4%	26	Trinidad and Toba	0.4%
2	India	12.9%	27	Mexico	0.4%
3	Malaysia	7.5%	28	Papua New Guine	0.3%
4	China	7.2%	29	Liberia	0.3%
5	Indonesia	5.8%	30	Mozambique	0.3%
6	Brazil	3.9%	31	Myanmar	0.3%
7	Vietnam	2.9%	32	Egypt	0.3%
8	Bangladesh	2.5%	33	Honduras	0.2%
9	Thailand	2.3%	34	United States	0.2%
10	Nigeria	1.9%	35	Guinea	0.2%
11	Turkey	1.5%	36	Jamaica	0.2%
12	Cameroon	1.1%	37	Japan	0.2%
13	Sri Lanka	1.0%	38	Morocco	0.2%
14	Guatemala	0.7%	39	Suriname	0.2%
15	Haiti	0.7%	40	Benin	0.2%
16	Dominican Repub	0.6%	41	Albania	0.2%
17	Venezuela	0.6%	42	Nicaragua	0.1%
18	Tanzania	0.6%	43	Guyana	0.1%
19	Algeria	0.6%	44	Ecuador	0.1%
20	Panama	0.5%	45	Cambodia	0.1%
21	Cote d'Ivoire	0.5%	46	Uruguay	0.1%
22	South Africa	0.4%	47	Iran	0.1%
23	Ghana	0.4%	48	Libya	0.1%
24	Argentina	0.4%	49	Pakistan	0.1%
25	Sierra Leone	0.4%	50	Angola	0.1%

Figure 1: Countries ranking according to the plastic waste generated (2021)

One percent of the world's population is in the Asian island nation of the Philippines, which accounts for 36.4% of the world's ocean plastic. The Philippines is home to seven of the top ten rivers that discharge plastic into the ocean. While more affluent nations manufacture more plastic per person than the Philippines, the trash there also happens to be more likely to be recycled, burnt, or disposed of in landfills. Together, the top five Asian nations that produce its most ocean plastic account for 69.8% of the plastic waste that ends up in the world's oceans.

Despite making up more than 3% of the global population, the United States generates only 0.2% of the ocean's plastic waste. So, before we give ourselves too much credit, it's important to note that the U.s produces the most plastic waste per person. Yet, because the majority of the nation is landlocked and the majority of our plastic waste ends up in landfills, it does not wind up in the ocean.

The majority of the nations on the list of the worst countries for ocean plastic pollution above are developing countries with little financial means for trash management.

- **Continents that Fuel the Plastic Crisis**

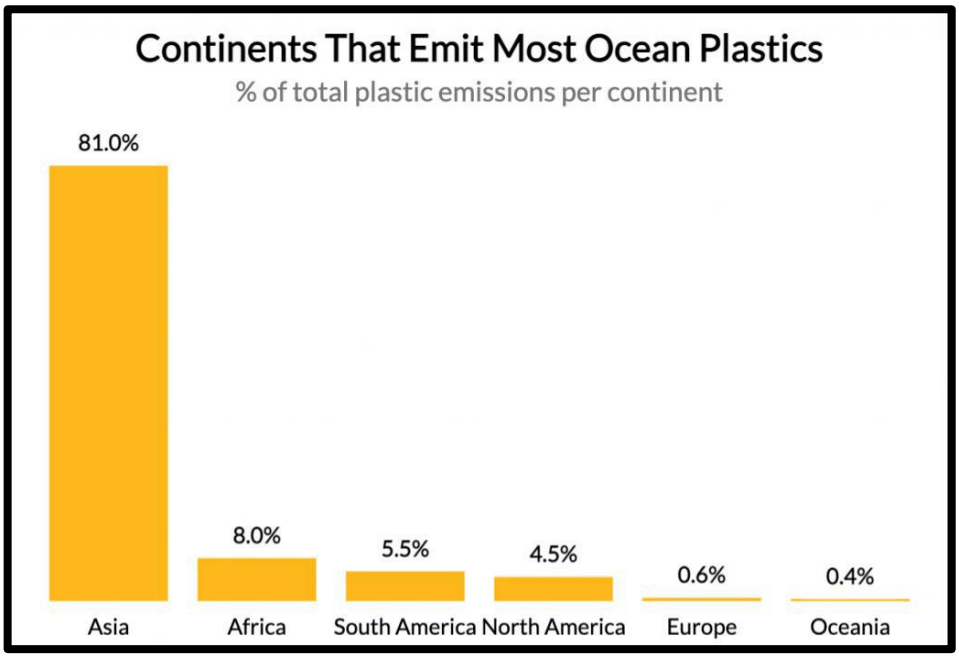


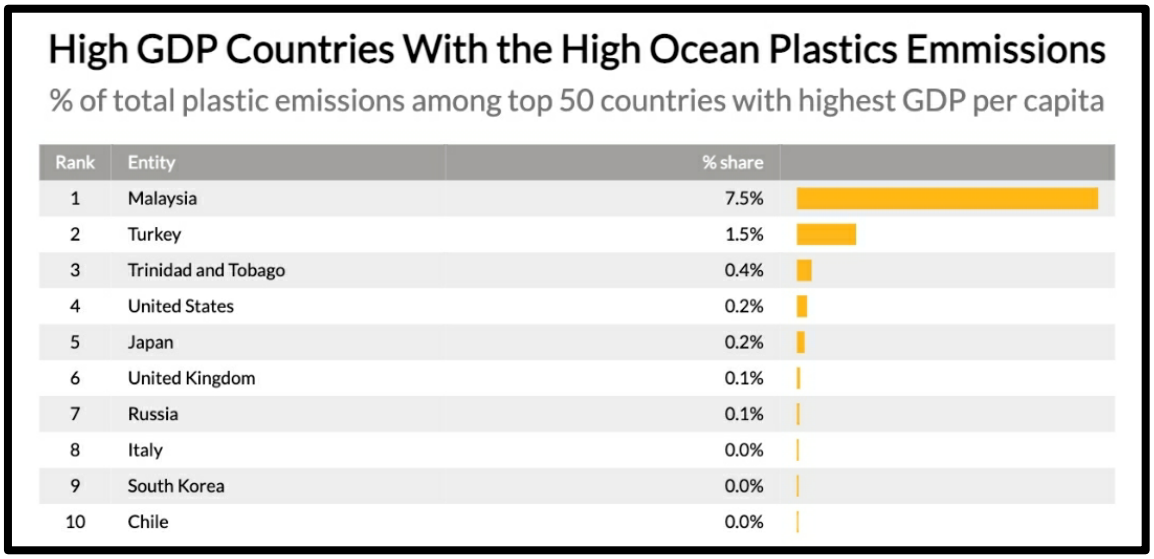
Figure 2: Continents ranking according to the plastic waste generated (2021)

Let's first examine the amount that each continent gives to the pollution of the oceans with plastic. The graph below shows the projected weight of ocean plastic coming from each continent:

Asia is the source of 81% of any and all ocean plastic. There are numerous rivers in Asia that flow into the sea. Plastic enters rivers and eventually goes into the ocean as a result of poor waste management. Only 4.5% and 0.6% of the plastic in the water comes from North America and Europe, respectively. Although it's still necessary to limit the use of plastic in these places, it's more probable that the plastic will wind up in landfills than in the ocean.

- **High GDP countries & ocean plastic**

Figure 3: Countries with GDP & Ocean plastic Emissions



Malaysia, Turkey, and Trinidad & Tobago are the top three nations that pollute the oceans with plastics among those that are more economically developed. The United States is the fourth-worst plastic polluter of the ocean among nations with the means to do better. Although they are among the biggest polluters in economically prosperous countries, the United Kingdom and Japan nevertheless produce a lot fewer ocean plastic than that of the Philippines and could serve as an example for how island nations should manage their garbage to keep plastic away from the ocean.

In the U.S, awareness of how our excess use of plastic is destroying the oceans has progressively grown. As a result, several municipalities have limited or done away with items like bendy straws and can rings. While local action has brought ocean plastic garbage under surveillance in the U.S., perhaps it's time to consider and take global action as well.

SUGGESTIONS

Actions we can take to lower ocean plastic:

1.Think broadly. The developed world is largely responsible for very little ocean plastic. While reducing our domestic plastic use is environmentally beneficial, any resolution to the caused by plastic problem must focus on the developing nations that produce the largest amounts of ocean plastic.

2.Aid in the establishment of waste-management infrastructure comparable to that found in developed nations. Plastic accumulates in these nations' waterways because there is no infrastructure for storing trash, which causes the plastic to wind up in the oceans.

3.Avoid shipping plastic products to nations where they might be mishandled. This especially applies to sending our recycling to underdeveloped nations.

4.Concentrate on the main rivers. 10% of the world's rivers are responsible for 18% of the plastic waste in the oceans. Eighty percent of the plastic waste in the world is found in about 1500 rivers. Start by keeping garbage out of the main rivers if you want to have the biggest influence on lowering the amount of plastic rubbish in the ocean.

5.By creating cutting-edge AI monitoring systems and robotic technology to detect pollution in our seas and streams and provide an accelerated method of cleaning it up, numerous emergent firms and organizations are altering the landscape of marine conservation.

CONCLUSION

The impact of ocean contamination on marine life is a major concern as it comes from various sources and crosses international borders. This issue arises due to the reckless and irresponsible exploitation of our planet's resources, putting marine habitats at risk and hindering oxygen production in the atmosphere. Despite the numerous expanding risks it poses to public health, we still don't fully comprehend its implications. Recently, its economic costs are being accounted for. However, it is possible to stop ocean contamination by adopting data-driven policies based on legislation, regulations, innovation, and enforcement, that target the most significant sources of pollution. These tools have been used by many countries to curb air and water pollution, and they are now being utilized to reduce ocean contamination.

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