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Rethinking Plastic Waste Management and Exploring the Sustainable Solution – An Evaluation of Bioplastics as Alternatives

ABSTRACT

India being a developing nation with growing population has become significant for migration and rapid urbanization resulting in heaps of solid waste, causing various environmental concerns. Among all, a notable amount of waste is from plastics which is from various sources as household, industrial products, food packaging, etc. Plastic turned out to be an unavoidable part in the past resulting to be an inevitable one in daily life. Growing demands are causing the generation of large amounts of plastic waste, and the poor state of waste management implies that large propositions of it is making its way hindering the existence of human life where only 15% of plastic being recycled. One of the consequences of using excess plastic is generation of plastic waste, especially through products which are of Single Use. These gradually breakdown into micro plastics severing into noxious substances and disintegrating the environment inclusive of the flora and fauna and human life collectively. In order to combat the excessive use plastic is being banned and bio plastics are introduced. This is expected to be a renewable form to reduce the problem of plastic waste which is suffocating and polluting the environment. The paper enunciates the impacts of plastic waste, its management and legislations with respect to the plastic waste management thereby discussing the ban of Single Use Plastics and the introduction of the Bio plastics along with its effectiveness.

KEYWORDS

Environmental concerns, Impacts, Management, Micro plastics, Bio plastics

1. INTRODUCTION

India being a developed country with second largest population in the world has become significant for industrialization and rapid urbanization. The masses of the nation are in frequent *migration and urbanization* which creates large amount of solid waste,

resulting in various environmental concerns, among all solid wastes a notable amount of waste is from plastics as it turns out to be an *inevitable* part of the life. However it poses serious threat to the environment and the organisms co-existing in it with its growing usage leading to the generation of the Single Use Plastics breaking down into *micro plastics* which are noxious. It has subsequently led to the introduction of the bio plastics to combat the plastic pollution and to cope up with the ban of plastics. The research paper on the *sub-theme "Emerging Areas of concern – Plastic Ban"* brings out the plastic pollution and its management with respect to the Rules and guidelines thereby provided, also enunciates the recommendations for management and combating the increasing threat caused due to plastic pollution.

2. PLASTIC POLLUTION AND BAN ON SINGLUE USE PLASTICS

Plastics are in general *synthetic organic polymers* widely used in different applications like water bottles, straws, food packing, medical supplies, electronic goods, etc dealing with our day to day life. In the end it becomes an *indispensable and versatile product* having a wide range of properties, chemical composition and applications. Environmental pollution by accumulation of plastic wastes is presently a major problem. Plastic production and accumulation has increased severely with notable accumulation caused due to mismanaged plastic waste which poses great threat to the environment. As much as a majority of the plastic ends up in landfills or the environment including its harm and detrimental effects to the oceans too[1]. Only a minimal margin of all plastic waste is recycled, while a specific percentage of about 12% is incinerated and the remaining 79% has accumulated in landfills, dumps or the natural environment. According to the Central Pollution Control Board (CPCB)[2], India generates approximately 3.47 million tons of plastic waste per annum where the per capita waste growth is from 700g to 2500g in the past five years. The chemical structure of such plastic makes them resistant to many natural processes of degradation as a result they are degrade slowly. Cumulatively they enter into the environment as mismanaged waste making it hard and impossible to persist in the ecosystem afflicting land, marine and human existence with detrimental and harmful impacts.

Single Use Plastics and Its Ban

The SUPs are made from fossil fuel–based chemicals namely the

[1] Sutter, John D, 12 December 2020, "How to stop the sixth mass extinction" CNN www.edition.cnn.com.
[2] Report on Alternative Products and Technologies to Plastics and their applications. http://www.niti.gov.in.

petrochemicals as the primary material are often referred to as *disposal plastics.* These are mostly used for packaging and service ware which are produced with the notion of being thrown away or recycled. These plastics are a specific examples of the problems of the *throwaway culture*. Despite investing in quality goods with long lasting nature it is often prioritized with convenience over long term impacts and durability. The dependence over these plastics has resulted in accumulation of waste at heaps.

In view of the above, more than 60 countries have introduced ban or levies on single-use plastics like plastic bags and foamed plastic products. However, till date no robust conclusions on the environmental impact of these bans and levies have been drawn. These bans in some cases have increased environmental problems, due to subsequent cases of smuggling and the rise of plastic bags being black marketed or switching to thicker plastic bags that are not covered by the ban. It is believed that though the ban on SUPs could be an immediate solution, will have a long-term degrading effect on the economy, particularly on the local industry which causes plastic pollution. Bans can also lead to that end of plastic products that have no end of life solutions for safe disposal, if these are smuggled into the Country. It is also important to note that change in consumer behaviour to avoid littering and promoting reuse of materials is very important.

As a consequence of this in India also the Single Use Plastics which were used in packaging of food, in straws, carry bags in local markets, etc. were banned. It was announced that six types of plastics were banned from its usage. A *Committee*[3] identified the SUP items to be banned based on an index of their utility and environmental impact. These were decided based on the criteria that disposable plastics which were commonly used in packaging and those items which were intended to be thrown away which were used once. India has also formulated a commitment to eliminate the use of SUPs by 2022[4]. As a matter of its integrity the *Plastic Waste Management (Amendment) Rules, 2022* were also enacted considering the plastic pollution and its ill effects.

3. BIOPLASTICS

Bio plastics is a plastic produced from *cellulose* that is made of wood pulp which is safe and degradable. Now, bio plastics can be produced from different biodegradable and non-biodegradable materials including weeds, hemp, plant oil, potato starch, cellulose, corn starch, etc. Sugar-based bio plastics can

[3] Expert Committee Report on definition of Single Use Plastics, www.chemicals.nic.in.

[4] Prime Minister announced the vow to abolish all the Single Use Plastics by 2022 on October 2020, www.theguardian.environment.in.

biodegrade under normal conditions for composting. Bio plastics are environmentally friendly since they require less fossil fuels during production in comparison to other types of plastic.

In the production of bio plastics, *substitute for fossil fuel* resources are used. This has made bio plastic production more sustainable and environmentally friendly in comparison to conventional plastic. The production of bio plastics decreases consumption of non-renewable energy and reduces the emission of greenhouse gases. It is believed that the problem of plastic waste generation and the accompanied environmental and public health effects can be handled if globally, manufacturers can embrace the use of bio plastics. The biodegradability of such plastics resulting with mere or less toxic results left seems to be a long running one to protect our natural environment from the problematic menace of the existing non-degradable and conventional plastic wastes protecting the natural environment with a better place for human and the flora and the fauna including the marine organisms. The bio plastics are greatly relied on as they are perceived to be eco-friendly and safer to the other organisms habituating relatively. Also when compared to the conventional and single use plastics these forms of biodegradable plastics are beneficial.

4. REGULATIONS ON PLASTIC WASTE MANAGEMENT IN INDIA

In India, the Ministry of Environment, Forest and Climate Change notified the most recent Plastic Waste Management (PWM) Rules on March 18, 2016 and amendment on March 27, 2018. These rules are applicable to every waste generator, local body, gram panchayat, manufacturer, importer, and producer. The rules restrict the use of carry bags and plastic sheets less than 50 micron thickness, restrict supply of raw materials (plastics) to unregistered units, stipulate guidelines of recycling plastics, and stipulate standards (IS code) for compostable carry bags. The PWM Rules also encourage the use of non-recyclable plastic waste in road construction or for energy recovery in cement kilns or for waste to oil, etc. The regulations require urban local bodies to develop and set up infrastructure for segregation, collection, storage, transportation, processing and disposal of plastic waste—recyclable plastics to be channelized to registered plastic waste recyclers. As per the regulation, urban local bodies are also responsible for creating awareness among all stakeholders about their responsibilities and ensure that no plastics are openly burnt. The rules also require producers, importers, and brand owners who introduce the products in market to collect back the plastic waste generated due to their products through the extended producer responsibility mechanism. However, proper

implementation and monitoring of these rules are still not being done in many parts of the country, leading to plastic waste becoming a littering problem[5].

In order to address the issues relating to plastic waste, the Plastic Waste (Management and Handling) Rules, 2011 were notified, which dealt with waste management predominantly. The Government has notified the Plastic Waste Management Rules, 2016, in suppression of the earlier Plastic Waste (Management and Handling) Rules, 2011. This was later followed by the *Plastic Waste Management (Amendment) Rules, 2022* announced by the Ministry of Environment, Forest and Climate Change with specific notification and instruction on the concept of *Extended Producer Responsibility* for the packaging with plastics. This is also proposed to be implemented in various stages with certain new definitions to non – woven bags, plastic waste processing, SUP, thermoset plastic and thermoplastic, etc.

Plastic Waste Management (Amendment) Rules, 2022

The significance of the newly introduced guidelines is it promotes the development and usage of the alternatives providing a broader area to economic activities relating to the sustainability in plastic industry. It primarily aims at strengthening the economy and business activities relating to the usage of plastics enabling reuse, repairing, sharing, recycling and remanufacturing with a limited arena and minimal usage of resources with an eye on carbon emissions. In addition to this there are certain specific provisions of 2022 Rules which are briefly mentioned as below:

1.) Classification of plastic wastes into four different categories namely rigid plastic, flexible plastic, multilayered plastic and compostable plastic respective to their properties
2.) Extender Producer Responsibility Certificates as a market mechanism similar to the carbon emission targets
3.) Reuse of rigid plastic packaging being mandated to reduce the production of plastic
4.) Centralised Online Portal as data repository to be established
5.) Setting up of a committee under the CPCB leadership to deal with matters relating to the EPR ad environmental compensation which would be based on the Polluter Pays principle for the consequences of damages caused to the environment, etc.

These are few notable implications from the newly established guidelines in order to promote the abatement of plastic pollution

[5] PlastIndia Foundation Report www.plastindia.blog.in.

and ensure the management of plastic wastes collectively with other regulations and organisations gradually resulting in the production of bio-plastics and alternatives to plastic which are environmentally safe and economically beneficial.

5. CONCLUSION AND RECOMMENDATIONS

Plastic has turned out to be an *inevitable necessity* among everyone. Its usage and aftermath effects however pose grievous threats to the whole human community along with alarms over the environment including the marine environment. The dependence of plastic has almost turned to be a predominant part in the *global economy.* It is the *time to rethink* on the manufacture, usage and disposal of plastics. The long term impacts exists parallel to its use and such overall problems could be established only by establishing better waste management systems including effective plans, proper implementation of existing laws and enacting efficient laws in future settling all the lacunae existing.

The introduction of Bio plastics could have been a more successful one, if India has well developed infrastructure facilities including the production, availability of raw materials, decomposing systems, etc. Despite all these there are enormous initiatives executed for the effective management and control of the colossal amounts of plastics manufactured and improperly disposed by all having a greater impact ultimately.

There are certain *recommendations* which could be computed from the paper which could serve better methods to abate the plastics wastes.

- Raise awareness amongst the public of the harm caused by plastic pollution through *education and outreach programs* to modify their behavior. In addition to this *individual responsibility* among everyone in order to arrive a better position and reduction of single-use plastics all over.
- Promotion and assessment of the alternatives, prior to the ban or levy is into actual execution. Reduction or abolishment of taxes on the import of materials involved in the alternative making.
- *Economic incentives* can be provided encouraging the usage of eco-friendly alternatives. Introduction of tax rebates and such other conditions to support its transition from plastic industry is needed.
- Expansion of the biodegradable plastics usage and edible plastics produced from the materials like bagasse extracted from sugarcane, corn starch, etc.
- Identify and engage key stakeholder groups like retailers, consumers, industry representatives, local government,

manufacturers, civil society, environmental groups, and tourism associations in order to ensure broad buy-in facilities.

- Enforcement of the waste management measure effectively, making sure of a clear allocation of roles and responsibilities. Monitoring and adjusting the management measures when necessary and update the public on progress.

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