



PLASTIC – MENACE FOR LIFE

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Article history:	Abstract:
Received: 26 th March 2021 Accepted: 7 th April 2021 Published: 26 th April 2021	Our motherland have been facing different challenges and problems. One of them is plastic wastage. Worldwide production of plastic is estimated about one hundred and eighty tons. The main sources of plastic waste are industrial, commercial and municipal waste. According to research in the world about 500 billions bags of plastic are used in a year. The life of these bags existence is about 1000 years which is taken by plastic to be degrade naturally. This causes serious problems which are faced by the life on earth. This plastic wastage has adverse effects on Environment, human being, animals, soil, marine life and birds. Different methods are being used in many countries to combat this threat which are landfill, inceration and recycling. The process like Biodegradation, caused by biological activity, which changes the chemical structure and breaks down of polymerized materials to mineral products. Biodegradable plastic which is now solving the issue of plastic disposal and recreation of new converted material. Aerobic respiration and aerobic biodegradation process is commonly used. Government strictly regulates the proper disposal of plastic waste. It is our responsibility to highlight these issue to save our environment over this planet.

Keywords: Pollution, Plastic, Biodegradation, Landfill , Incineration, Recycle.

INTRODUCTION

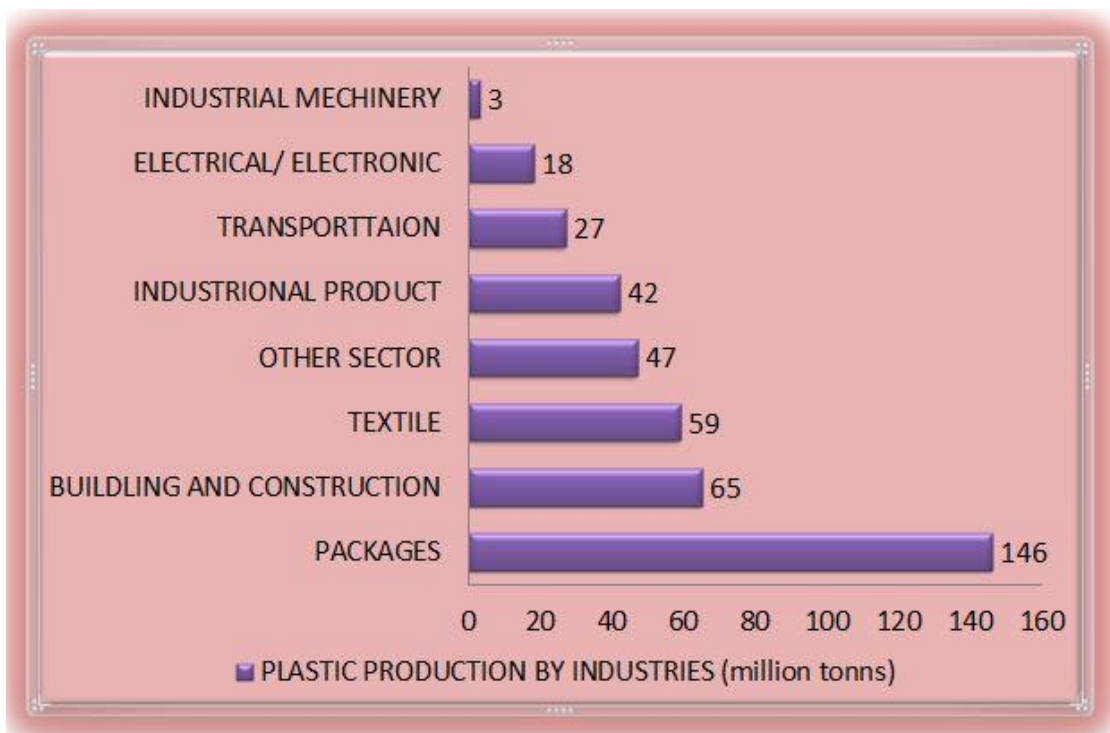
Our motherland earth is facing so many environmental issues including rapid increase of waste flows, climatic change, increasing carbon stock and energy depletion. One hundred and eighty millions tons each year production of plastic is globally, which is constantly increasing day by day due to increasing demand of plastic in the world (Mahalakshmi, 2014). The vast majority of these bags are discarded as waste material usually after a single use (Moharam & Maqtari, 2014). About Fifty four percent (54%)of the world’s plastic production is polyethylene and polypropylene. Beside this, in many countries like Pakistan any one can see the plastic bags hanging in the trees and bushes, floating in the lakes and rivers along with scattered in the public recreational parks and roads. (Bilal., et al 2016). In our country Pakistan, according to an estimate 600 to 700 small sized plastic manufacturer units have been working presently. Plastic particles in the ocean have contain quite high levels of organic pollutants (Webb et al., 2012). Many species face problem due to plastic pollution, sometime of these species trapped in plastic made nets and stuck in plastic objects, when they are in search of food (Asuquo, 2018). More than two hundreds and sixty (260) species, including invertebrates have been reported to have either ingested plastic or become entangled in the plastic (Reddy et al., 2014). Nets and fishing rope made by plastic can cause entanglement on the life on earth as well as in the ocean (Golam Kibria, 2017). Adverse impact of plastic wastes on our health and environment is evident due to their improper disposal and poorly managed recycling system (K, 2018).

ECONOMIC IMPORTANCE OF PLASTIC

The life of these bags existence is about one thousands years which is taken by plastic to be degrade naturally (Moharam & Maqtari, 2014). The use of plastic is increasing day by day globally which is exceeding 12% per year and 140 millions tons of synthetic polymers are producing every year (Fesseha, 2019). Worldwide the use of plastic is 260 million tons in 2008 (Reddy et al., 2014). For packaging applications 30% of the plastic is used in the whole world. In packaging Synthetic plastics used (Shah et al., 2008). Out of which 1.23 million tons of production of plastic is wasted estimated per Annum In Pakistan (Shah et all, 2008). Plastics are relatively very low-cost, durable, and very easy to manufacture (Alshehrei, 2017). Plastic bags are commonly used for carrying groceries in most of the

countries including Pakistan (Bilal., et al 2016). There is 15% annual growth rate of plastic industries in Pakistan(Shah et al., 2008). Today's six dominate plastic in markets are polystyrene (PS), Polyethylene (PE), Polyethylene terephthalate (PET), Polyurethane (PUR), Polyvinyl chloride (PVC) and Polypropylene (PP), (Golam Kibria, 2017).

Figure 1, showing plastic production by industries.



PLASTIC IMPACT ON ENVIRONMENT AND LIVING ORGANISMS

ENVIRONMENT

Destruction of nature is one of the major problem (Moharam & Maqtari, 2014). Plastics, as an innovative material with high durability and performance, have many negative drawbacks to the environment (Gu, 2017). Bags can persist up to 1000 years to degrade and accumulation of plastic bag wastes causes environmental pollution that can be manifested in number of ways (Moharam & Maqtari, 2014). The main sources of plastic waste can be industrial, commercial and municipal waste (Gupta, 2017). Plastics do not naturally degrade to a large degree when released into the Environment (Webb et al., 2012). In the end plastics waste is converted to solid waste and remain in this environment (Mahalakshmi, 2014).

HUMAN

Human and animals health is affected by plastic pollution in rural and urban areas of many countries (Moharam & Maqtari, 2014). Plastics and their additives are also causing serious problems related to human Health (Fesseha, 2019).

ANIMALS

Animals death is caused by waste of plastics both by being traps inside the waste plastic traps or by eating plastic items considering as a food (Fesseha, 2019). Wild and domestic animals death is also linked with this problem (Moharam & Maqtari, 2014). Many animals such as fish, turtles, goats, sheep and crow intake plastic and ultimately die (Bashir, 2013). Plastic debris poses a direct threat to wildlife (Webb et al., 2012).

SOIL

The long-term accumulation of non-biodegradable polymers in the soil leads to a decrease in soil fertility (Ahmed et al., 2018). After a short services it is obvious for the plastic bags to become waste (Bilal., et al 2016). Harmful toxins which are release by plastics are released into the soil and affect groundwater environment (Fesseha, 2019).

MARINE ANIMALS

An estimated Five trillion pieces of plastic are floating in the world's oceans from the Arctic to Antarctic (Golam Kibria, 2017). In 2004, it was estimated that seagulls in the North Sea had an average of thirty pieces of plastic in their stomachs (Reddy et al., 2014). Plastic wastage is an aquatic environment challenge since long time and do not biodegrade (Golam Kibria, 2017). The amount of plastic polymers in the oceans has exceeded six times compared to plankton due to which aquatic birds and fishes life is in danger (Ahmed et al., 2018). Many ecologically and hazardous pollution effects in ocean environment is due to plastic (Webb et al., 2012). Many organisms swallow pieces of plastic like fish, turtles, whales, shellfish and seabirds results physical damage and cause death (Golam

Kibria, 2017). Globally, at least 23% of marine mammal species, 36% of seabird species and 86% of sea turtle species are known to be affected by plastic debris (Asuquo, 2018). Oceans are generally contaminated from micro-plastic debris which floats on the sea surface and Plastic pollution also affect the birds like Seabirds, which obstruct their digestive tract causing tissue damage (Ganguly, 2019).

BIRDS

Many birds in the marine environment dive for food and thereby come into contact with plastic debris (Asuquo, 2018).

PLASTIC DISPOSAL METHODS

Landfill

Disposing waste of plastic under the soil cover is Landfilling. The best method for the problem of disposing plastic is landfill method (Hung et al., 2014). It is known as dumping of waste material. the site for the disposal of waste materials is generally known as dumping ground as well as landfill site. Landfills is commonly used method worldwide for organizing plastic waste disposal (Singh & Sharma, 2016). In landfill, the plastics wastage degradation occur due to the process of physical or chemical change in plastic polymer (Hung et al., 2014).

Incineration

The other method used for disposal of plastic waste commonly is incineration (Webb et al., 2012). It Include organic substances combustion present in waste materials with high temperature waste treatment systems such as "thermal treatment". This process convert wastage into heat, ash and fuel gas (Singh & Sharma, 2016).

Recycling

Waste materials converted into new products is known as Recycling (Singh & Sharma, 2016). Efforts to promote recycling of plastic along with to reduce the consumption of plastics (Reddy et al., 2014). Mechanical processing and chemical are used for plastic recycling (Webb et al., 2012). The purpose of recycling is shown in

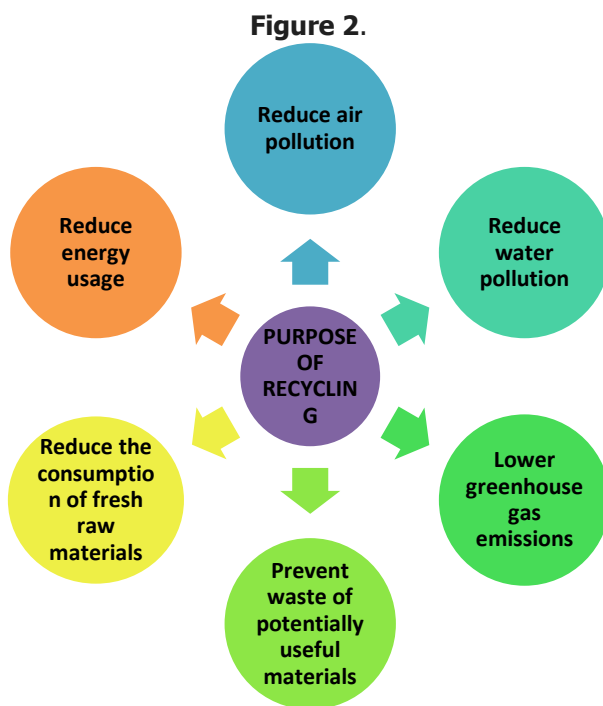


Figure 2; showing the purpose of recycling

BIODEGRADATION

Biological activity caused Biodegradation process, which changes chemical structure to naturally occurring metabolic products (Mahalakshmi, 2014). With the micro organisms such as bacteria, archaea and fungi, the polymerized materials is broken down into mineral parts having H₂O and CO₂/CH₄ (Gu, 2017). Aerobic respiration and aerobic biodegradation (**Table 1**) is an important part of the natural attenuation of contaminants in many hazardous waste sites (Fesseha, 2019).

TABLE 1, showing comparison between aerobic and anaerobic biodegradation.

<p>Aerobic biodegradation</p>	<p>Anaerobic biodegradation is the breakdown of organic contaminants by microorganisms when oxygen is present. Its uses oxygen as electron acceptor (Alshehrei, 2017).</p>	<p>$C \text{ plastic} + O_2 \longrightarrow CO_2 + H_2O + C \text{ residual} + \text{biomass.}$</p>
<p>Anaerobic biodegradation</p>	<p>Anaerobic biodegradation is the breakdown of organic contaminants by microorganisms when oxygen is not present (Fesseha, 2019). Some anaerobic bacteria use nitrate, sulphate, iron, manganese and carbon dioxide as their electron acceptors, to break down organic chemicals into smaller compounds (Alshehrei, 2017).</p>	<p>$C \text{ plastic} \longrightarrow CH_4 + CO_2 + H_2O + C \text{ residual} + \text{Biomass}$</p>

BIODEGRADABLE PLASTIC

When all organic plastic compound undergoes a full biodegradation process, the material will be the biodegradable (Mahalakshmi, 2014). Microorganisms action on the degradable plastic and causes biodegradation (Gnanavel et al., 2012). The new method is biodegradable plastic which is now solving the issue of plastic disposal and recreation of new converted material (Tokiwa et al., 2009). The uses of biodegradable plastic is on large scale in many fields such as toys, food packages industries, building factories, medicine along with agriculture. Many biodegradable bags which are manufacture by biodegradable plastic are degrade when they are exposed to sunlight (Gnanavel et al., 2012).

CONCLUSION

This review has covered the major concerns about the plastic pollution and biological methods employed to reduce and degrade the polymers. The biodegradable plastic are used in the daily life which is very good option to overcome the problem which is being faced globally. There are other options as well like recycling of plastics, disposal methods, incineration, biodegradation and the standards used in assessing polymer degradation. To minimize the environmental effects of plastic waste, two major approaches have been applied: the first is to use synthesize biodegradable plastics and the second is to extract selected microorganisms that can be used for biodegradation of plastic wastes. With the increased consumption and production of biodegradable or degradable plastics on the market, it is very much urgent need of the time to decide the best option for plastics disposal. Very important for us is to consider this problem on priority basis and worked together on these parameters. It is clear that polymers can be degraded to some extent in the appropriate environment at the right concentration. It is important to follow comparable international standard methods of determining the extent of biodegradation. It is our responsibility to highlight these issue in front of government and among public.

RECOMMENDATION

1. Government strictly regulate the proper disposal of clinical plastic waste such as syringes, gloves etc. Government must support the manufacturer industries for the manufacturing of biodegradable bags which can be recycle, reuse and more durable. Advance technologies and practices information should be shared between countries.
2. Reduce, recycle, reprocess, recover plastic use and plastic waste. A reduction in single-use plastic bags.
3. The involvement of people and private sector through NGOs could improve the efficiency of Plastic waste management.
4. Littering of plastic bags and other plastic made things should be prohibited in cities, towns and urban areas.
5. Land-filling should be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological process.
6. Development of indigenou and homegrown technologies for plastic waste management.
7. Bye-laws on plastic waste management should be enforced. Moreover, house-to-house collection of SW should be organized. The collection bins must have a large enough capacity to accommodate 20% more than the expected waste generation in the area. The collecting bins mush have a large enough capacity to accommodate 20% more than the expected waste generation in the area.
8. Policy formulation and implementation for plastic waste management should consider the needs of all levels of the community. Their is social responsibility to proper dispose off wastage. plastic waste management should be taught in all levels of our education system from primary school level to university level as compulsory subject.
9. Public awareness should be created especially at primary school.
10. Simple solutions be taken at home, like banning food-service foam and plastic straws, won't make much of a dent in mismanaged plastic waste. Plastic wastage from home, industries and manufacturer factories should be separated from the other wastage outcomes and should be treated separately according to their standard.

11. Restaurants, malls and retailers must be taken on board in zero plastic waste initiatives. Replace the plastic bags with paper bags or cloth.
12. Placing clean-up equipment near the coasts where much of the plastic pollution originates. Reducing plastic waste generation. Preventing illegal plastic waste dumping

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