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Adverse Impacts of Plastic Pollution on Environment

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ABSTRACT

Plastic is largely produced manmade material whose quantity is almost gets doubled each decade. Plastic production rate is highly increased since 1950. Plastic and plastic products have become an essential part of human life due to various advantages like easy availability, low cost and long life. Accounting these advantages, the plastic is used in all the industry sectors and in household activities. As a production and use is high, the quantity of waste plastic generation is also very high, results into pollution. Plastic if not disposed properly or even during disposal, produces various toxic gases like dioxins, carbon monoxide which results into pollution. The pollution includes air, water and soil pollution and it has high potential to threat socio-economic culture. The study is carried out to identify effects of plastic pollution and develop a technique that can treat waste plastic to reuse and recycle it as a construction material and also to reduce the environmental pollution due to plastic.

KEYWORDS:Plastic, Dioxins, Carbon Monoxide, Socio-Economic, Recycle.

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INTRODUCTION

Plastic has various positive attributes over other materials; like Safe and hygienic, light weight, excellent barrier, restrict bacterial growth, low fuel consumption, low cost. As the production and use is very high, the quantity of waste produced is also very high. Most of the plastic products are thrown away after single use results into large quantity of waste plastic. If plastic is not disposed properly, it results into pollution. Also during treatment of waste plastic, if proper precaution is not taken, it liberates toxic gases like dioxins and carbon monoxide. These gases are harmful for environment as they are main cause for global warming and the waste plastic is also responsible for soil, water and air pollution.

TOXIC COMPOUNDS ASSOCIATED WITH PLASTIC

The harmful compounds and chemicals associated with plastics can be divided into three categories[1] as;

- Ingredients of the plastic
- Material and byproducts of manufacturing
- Chemicals adsorbed from the environment

The toxic compounds released are the combination of all these chemicals. Some of the compounds which have high polluting potential are called as primary pollutants such as heavy metals, pesticides, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)[1]. In addition to these compounds, it also includes methanol, cyclohexane, heptane, potassium per-sulfate and benzoyl peroxide. It also includes some catalysts such as tributylin, zinc oxide and copper chloride, which are considered very toxic.

NATURAL FACTORS SUSCEPTIBLE TO POLLUTION

Pollution caused by plastic materials during their production, discarded state or also during un-scientific disposal method results into liberation of toxic gases. Plastic can sustain for longer period without decomposition, which results into pollution. Due to such negative abilities of plastic, it results into direct adverse impact and pollution of natural bodies which are as follows;

- Air environment
- Land environment
- Surface water and ocean environment
- Groundwater environment
- Human health and wild life.

EFFECTS OF PLASTIC POLLUTION

Air Environment: Burning of plastic in the open air and unscientific disposal leads to environmental pollution due to the release of poisonous chemicals[2] which includes dioxins and carbon monoxide. Release of these toxic gases results into ozone depletion, generation of greenhouse gases and global warming.

Figure 1. Air Pollution Due To Open Burning Of Plastic[3]

***Land Environment*:** When plastic is dumped in landfill sites, it comes in contact with water and other hazardous chemicals. Such compounds then can reach the soil and accumulate in the soil. Which affects index properties of soil, reduces fertility of soil and ultimately causes soil pollution.

Figure 2. Land and Soil Pollution Due To Openly Discarded Plastic Waste[4]

Surface Water and Ocean Environment: Plastic which is discarded and thrown away in water streams like lakes pollutes water. Plastic in rivers can reach the oceans and results into ocean pollution. Many lakes and oceans have tremendous problem of floating plastic as it breaks the

contact of oxygen with water also due to consumption of some plastic with food, many marine animals found dead and most have born with deficiencies as they swallow toxic chemicals of plastic. Toxic plastic waste materials also reduce quality of water.

Figure 3. Marine pollution due to plastic waste[5]

Groundwater Environment: Most of the plastic waste in dumped on landfill sites having improper drainage facility. Leachates are formed containing toxic chemicals that infiltrate to subsoil reached underground water bodies. Such percolation of toxic leachates from plastic waste pollutes aquifer, underground water table.

Human Health Impact: Plastic waste can directly as well as indirectly affects human health. Following table shows impacts of different plastics on human health

Table No 1:"Health Effects of Waste Plastic"[6]

Type of plastic	Threat potential	Health impacts
PET	High	• Cancer development • Skin problem • Pregnancy issues
HDPE	Medium	• Endocrine disrupter
PVC	High	• Endocrine disrupter • Asthma • Allergies • Breast cancer
LDPE	Medium	• Endocrine disrupter
PP	Medium	• Asthma
PS	High	• Affects lungs, liver • Affects immunity
Other	Very High	• Hormone damage • Affect chromosome • Affect immunity • Carcinogenic • Diabetes & obesity

Toxic chemical compounds leached is ground, mixed in water bodies are consumed by plants and animals during their life activities and if people consume such plants or animal, it cause health issues to the consumer. During treatment of plastic if unscientific method is used or safety precautions are not taken then the toxic fumes from plastic can directly reach in the body through respiration, causes different diseases. The impact of plastic pollution on human health can be long term or short term depending upon the exposure conditions and type of plastic.

Effect on Animals*[7]*: Plastic wastes have been mistaken for food by numerous animals, mainly marine wildlife. Largequantities of plastics have been found in the stomachs of many dead animals. When the plastics are ingested, they upset or fill up the digestive systems of the animals thus contributing to their death due to blockage or starvation.Marine animals can also be trapped in plastic waste where they are exposed to predators orstarve to death. The plastics may also contain toxic chemicals which can harm the animal's vitalorgans or biological functions. Cumulatively, plastic wastes have profoundly affected animals in aquatic, marine, and terrestrial ecosystems.Many of the new born animals takes birth with some inborn deficiencies. Also many cases are found in which due to entrapped in plastic rings, the body shape of many animals like turtle had changed, which results in early death of that animal.

Figure 4. Abnormal growth of turtle due to entrapped plastic[8]

Figure 5. Adverse impact of waste plastic on animals[9]

CONCLUSION

- The plastic even if a low cost and easily available material having versatile abilities to use as a daily life material, on other hand have high pollution potential.
- The waste plastic can easily pollute the environment i.e. air, soil, water, groundwater which ultimately affects the ecosystem.
- Toxic chemicals present in plastic can affect human health and also accumulation of such hazardous compounds results into health implications.
- Various plants, microorganisms, animals all are affected by plastic pollution. These organisms at one point or another take-up or swallow the toxic chemicals from the plastics. When the smaller animals are intoxicated by ingesting plastic, theyare passed on to the larger animals disrupting the interrelated connections within the food chain.

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