

Impact of Plastic on Environment

Suman Kapur

PG Deptt. of Zoology

DAV College, Sector-10 Chandigarh, India

Abstract— Plastic is ubiquitous and convenient in our lives. It is widely used materials in modern society. The use of plastic is an alarming threat to the environment. It breaks down into small particles (micro-plastics) that release toxins into the food chain and causes poisoning to wildlife and marine life. Plastic does not naturally biodegrade in the environment which can cause negative impact on biodiversity and human health. Plastic bags are difficult and costly to recycle and most end up on landfill sites where they take around 300 years to degrade. By refusing to use plastic bags, we can make a huge difference to the pollution problem. A combination of legislation and the enhancement of ecological consciousness through education is likely to be the best way to solve such environmental problems and searching for efficient and low-cost ways to reduce their use of plastic and to reuse the plastic. Management of plastic waste start at home with consumer, but ultimately depend upon governments all around the world as well.

Keywords — plastic, pollution, polythene, non-biodegradable.

I. INTRODUCTION

The worldwide consumption of plastic in 2008 was 260 million tonnes. In 2015, it was approximately 297.5 million tonnes. The rapid growth of the use of plastic is difficult to control as plastic is versatile, lightweight, flexible, moisture resistant, strong and relatively inexpensive. These attractive qualities of plastic have made it famous worldwide. However, it is durable and very slow to degrade and is used for the production of many products and all ultimately become waste with staying power. The combination of our attraction to plastic coupled with our consumption, discarding and littering has become lethal in nature. From microscopic organisms i.e. from zooplankton to large animals such as birds and the whale, plastic has been greatly affecting marine life on shore and off shore [2]. In a 2006 report, *Plastic Debris in the World's Oceans*, Greenpeace stated that at least 267 different animal species are known to have suffered from entanglement and ingestion of plastic debris. According to the National Oceanographic and Atmospheric Administration, plastic debris kills an estimated 100,000 marine mammals annually, as well as millions of birds and fishes.

In the present scenario, the plastic products have become such an integral part of our daily life that its production has crossed 150 million tonnes per year globally. It has also shown a significant growth in the employment upto 4 million people. More than 30,000 Small and Medium Enterprises (SME) are being run. The utilisation of plastics ranges from toys to aircrafts, from dolls to hosepipes, from soft drink bottles to refrigerators, from gramophone records to television sets. Packaging represents the single-largest sector of plastics use and accounts for 35 per cent of plastic consumption. According to an ASSOCHAM (Associated Chambers of Commerce and Industry of India) study, the demand for plastics is likely to double to about 20 million metric tonnes (MMT) by 2015 from the current level of about 10 MMT. The study further reveals that total consumption of plastics in India is about 4 million tonnes and the waste produced is about 2 million tonnes.

Plastic due to its properties has become necessity of modern living and once its life is over, it starts posing environmental problems. Plastic is used in paints, cable coverings and window frames to prevent rotting, but this also makes degradation that much more difficult. Plastic food packaging increases the shelf life of foods, and provides a cheap, hygienic and versatile range of wrappings. Although it has obvious advantages for the food industry, the huge increase in plastic packaging has greatly increased plastic waste and, consequently, litter. The estimated generation of plastic waste in India amounts to approximately 5.6 million tonnes per annum (TPA) which is about 15342 tonnes per day (TPD) while thermoset plastics or non-recyclable plastics account for the remaining.

II. ENVIRONMENTAL HAZARDS

Modern lifestyle requires easily disposable products such as soda cans, water bottles, has led to increasing amount of plastic pollution throughout the world. A major toxic pollutants of overline plastic used in our plastic bags. It is composed of toxic chemicals which cause environmental problems.

There are three possible environmental problems caused by plastic bags. First, plastic bags are mostly made from oil, natural gas or coal, and these are all limited natural resources that must be conserved. Second, the manufacture of plastic produces large quantities of harmful pollutants, which manufacturing companies need to deal with properly. The major chemicals that go into the making of plastic bags are highly toxic and some of the constituents of plastic such as benzene and vinyl chloride have been proven to cause cancer, while others like gases and liquid hydrocarbons spoil the earth and air. The noxious substances emitted during the production of plastic are synthetic chemicals like ethylene oxide, benzene and xylenes. Besides seriously impairing an already fragile ecosystem, these chemicals can cause an array of maladies ranging from birth defects, cancer, and nerve and immune disorders, to blood and kidney ailments.

Third, old and unwanted plastic bags are not always easy to dispose off. Plastic bags defy any kind of attempt at disposal, be it through recycling, burning or land filling. Plastic bags when dumped into rivers, streams and sea contaminate the water, soil, marine life as well as the air we breathe. When plastic bags are burned, they release a host of poisonous chemicals including dioxin into the air. Moreover, recycling of plastic is uneconomical, polluting and labour intensive. It is associated with skin and respiratory problems resulting from exposure to and inhalation of toxic fumes, especially hydrocarbons and residues released during the process [5]. Plastic bags are known to clog drains and thus hit urban sewage systems. Choked drains provide excellent breeding grounds for mosquitoes, besides causing floods during the monsoon. Due to indiscriminate dumping of plastic bags on land, toxic metals such as lead and cadmium pigments leach into underground water. Buried in landfill sites, plastic takes hundreds of years to degrade [7].

III. PLASTIC USAGE AND EFFECTS

Polyvinyl chloride (PVC) Leaches di (2-ethylhexyl) phthalate (DEHP) or butyl benzyl phthalate (BBzP), depending on which is used as the plasticizer or softener (usually DEHP). DEHP and BBzP are endocrine disruptors mimicking the female hormone estrogen; have been strongly linked to asthma and allergic symptoms in children; may cause certain types of cancer; and linked to negative effects on the liver, kidney, spleen, bone formation, and body weight. In Europe, DEHP, BBzP, and other dangerous phthalates have been banned from use in plastic toys for children under three since 1999. Dioxin is a known human carcinogen and the most potent synthetic carcinogen ever tested in laboratory animals. A characterization by the National Institute of Standards and Technology of cancer causing potential evaluated dioxin as over 10,000 times more potent than the next highest chemical (diethanol amine), **High-density polyethylene (HDPE)** **Polyethylene terephthalate (PET or PETE)**, (2ethylhexyl) phthalate (DEHP), **Low-density polyethylene (LDPE)** **Polypropylene (PP)**, **Polystyrene (PS)** –used in Styrofoam containers, egg cartons, disposable cups and bowls, take-out food containers, plastic cutlery, and compact disc cases used in ketchup bottles, yogurt and margarine tubs, medicine and syrup bottles, straws, and other opaque plastic containers, including baby bottles are considered a safer plastic. Research on risks associated with this type of plastic is ongoing. The estimated decomposition rates of most plastic debris found on coasts are Foamed plastic cups : 50 years, Plastic beverage holder: 400 years, Disposable diapers: 450 year, Plastic bottle: 450, Fishing line: 600 years.

IV. EFFECTS ON ANIMALS

Plastic has potential to poison animals and thus adversely affects the human food supplies. It is also dangerous to large marine mammals. Some sea animals like sea turtles have been found to have large properties of plastics in their stomach. Plastic locks the digestive tract of animals and starves them. Sometimes marine mammals get stuck in plastic products such as nets and get killed. Many fish, seals, turtles and birds have died due to plastic debris. These animals get caught in the debris and end up suffocating and drowning. Also they fall an easy prey to the predators. At least 267 different animal fishes of the sea have suffered from plastic pollution and approximately 4,00,000 marine mammals die every year due to plastic pollution.

Some species of marine animals which are consumers of jelly fish, often takes plastic bags for their natural prey by mistake and die due to the obstructions in their oesophagus. Large amount of plastic have been found in the stomachs of beached whales. Some of the tiniest bits of plastics are also consumed by small fish and then plastics enters into food chain of human beings. Sea birds also get greatly affected by plastic pollution. This way plastic debris gets transferred from prey to predator. Ingested plastic obstruct and damage the digestive system of birds reducing its digestive immunity and leads to malnutrition, starvation and death. These chemicals get accumulated in the body tissues of the birds and affect its reproductive ability, immune system and hormone balance. Floating plastic debris can produce ulcers, infections and can lead to the death of the birds.

Animals exposed to plastic pollution can experience developmental defects. Sheep have been found to have lower birth weights when prenatally exposed to Bisphenol A, can shorten the distance between the eyes of a tadpole and also affects egg hatching resulting in decrease in body weight, tail length and body length. It affects gene expression related to the thyroid hormone axis, can decrease thyroid hormone receptor (TR) activity by increasing TR transcriptional co-repressor activity and can lead to hypothyroidism. BPA can disrupt normal

physiological levels of sex hormones by binding to globulins that normally binds to sex hormones such as androgens which can disrupt the gonadal development and sperm production [4].

V. PREVENTION OF PLASTIC HAZARDS

4.1 By 4Rs

Plastic management strategies include 4Rs; i.e. reduce: means limited usage of resources to generate less wastage. Efforts are being made to reduce use of plastics and to promote plastic recycling, Reuse: means reusing either for original purpose or entirely different purpose, Recycle: means to make completely different items, thereby reducing the production of more waste and Refuse: means refusing the use of non-biodegradable items such as plastic bags.

4.2 Biodegradable and degradable plastic

Biodegradable plastics have many advantages and disadvantages. Biodegradables are biopolymers that degrade in industrial composters. These do not degrade as efficiently in domestic composter and methane gas may emit due to slow process.

4.3 Manual Clean Up

The simplest, yet highly effective, action is the manual clean up of the beaches, coasts, rivers, lands and estuaries. The Clean up the World program is run in conjunction with UNEP. It engages more than 40 million people from 120 different countries in clean up operations.

4.4 Ban on plastic bags

Several countries have already banned their use and more will doubtless follow. Several Indian states such as Maharashtra, Delhi, Punjab, Rajasthan, Himachal Pradesh, Goa etc. banned their use. Mumbai's storm water drainage choking with accumulated plastics waste, making the floods unmanageable is an old story. The Environment Ministry has banned manufacture and use of plastics carry bags less than 8 inches* 12 inches in size 20 micron in width. The ministry has also asked State Governments to register all plastics manufacturing unit, so that these can be regulated. However, the implementation of the order has been tardy, evident from the large number of polythene bags strewn in every major town and city. In New Delhi Excessive use of plastic bags and their unregulated disposal has been choking lakes, ponds and urban sewerage systems, the Supreme Court said it posed a threat more serious than the atom bomb for the next generation [6].

Alternative to Plastic Bags

The alternative to plastic bags is paper bags, jute bags and cloth bags as these are eco-friendly. Jute bags are most suitable substitute then paper and cloth, because it is cheaper than cloth and reusable. Jute is one of the strongest natural plant fibers which is durable and re-usable. It is a 100% natural material that consumes carbon dioxide and releases oxygen into the atmosphere. Fabrics made of jute fibres are therefore carbon dioxide neutral and are naturally decomposable. Though paper bags are cheaper then jute bags but less durable. In 2013, the UAE Ministry of Environment and Water has banned plastic bags completely. The West Bengal Government, which has decided to ban plastic bags in Kolkata and other prominent towns and cities in the State, intends to make use of jute bags mandatory through suitable legislation. Until a real alternative is freely available, the only solution is a re-think of attitude like Re-use bags when shopping, choose biodegradable bags to use for litter, re-use large plastic sacks whenever possible and refrigerate food in containers rather than plastic bags [7].

While deciding a Public Interest Litigation (PIL), the Supreme Court of India observed the following facts and issued notices to the Centre and State Governments on the PIL seeking ban on use of plastic bags in municipal area which did not have a garbage collection, segregation and disposal system. The bench wanted to address the larger questions arising from indiscriminate use of plastic bags which not only posed a grave threat to nature and environment but also to the human race itself.

VI. CONCLUSION

Plastic bags and bottles, like all forms of plastic, create significant environmental and economic burdens. By refusing to use plastic bags, we can make a huge difference to the pollution problem. Stop the Plastic Pollution, Be Part of the Solution. Use of plastic products create litter, hurt marine life, and threaten the basis of life on earth. We should ignore our selfish needs and think upon the lives of future generations. As a responsible citizen we must take precautions while using plastic products, reduce and refuse the consumption and encourage others to do the same. All of us can take little steps that we can reverse the tide of toxic, non-biodegradable pollution so that it does not overtake our planet.

REFERENCES

- [1] <http://www.prokerala.com/going-green/ill-effects-of-plastic.php>
- [2] Jose, G.B. Derraik, The pollution of the marine environment by plastic debris; a review. *Marine Pollution Bulletin* Vol.44, Issue 9, September 2002: 842-852.
- [3] Plastic Pollution: A Threat to Ecosystem by Sanchita Paul dated 27.02.2015, <http://www.mapsofindia.com/my-india/india/plastic-pollution-a-threat-to-ecosystem>
- [4] "Plastic pollution". Encyclopaedia Britannica. Retrieved 1 August 2013.
- [5] The Report of the National Plastic Waste Management Task Force, Ministry Of Environment and Forests, Government of India, 1997.
- [6] Weekly Reader publication, Current Events. "Paper or plastic? States wrestle with plans to ban plastic bags." *Opposing Viewpoints Resource Center*. 24 March 2008. Web. 25 December 2009.
- [7] Dana Gopal, N.M., Phebe, P., Suresh Kumar, E.V., Vani, B.K.K., Impact Of Plastic Leading Environmental Pollution, National Seminar on Impact of Toxic Metals, Minerals and Solvents leading to Environmental Pollution-2014 *Journal of Chemical and Pharmaceutical Sciences*. JCHPS Special Issue 3: October 2014: 96-99.