

Chapter 2

Plastic Waste Environmental and Human Health Impacts

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ABSTRACT

Plastics have become a vital asset for humanity. Plastics are known as synthetic materials produced from synthetic or semi-synthetic organic polymers derived from petro-based chemicals, able to displace traditional natural polymeric materials (wood, stone, ceramics, etc.). Plastics have malformed everyday life; usage is increasing, and annual production is likely to exceed 300 million tons by 2010. In this chapter, the authors blend current understanding of the benefits and concerns surrounding the use of plastics and look to future priorities, challenges, and opportunities. Plastics cause serious environmental pollution such as soil pollution, water pollution, and air pollution. Application of proper rules and regulations for the production and use of plastics can reduce the toxic effects of plastics on human health and the environment.

INTRODUCTION

Plastic waste is a growing concern and the drivers behind it look set to continue. Although recently there has been a slight decrease in plastic production, this is unlikely to be maintained. Plastic is a highly useful material and its applications are expected to increase as more new products and plastics are developed to meet demands. The increased use and production of plastic in developing and merging countries is a

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particular concern, as the sophistication of their waste management infrastructure may not be developing at an appropriate rate to deal with their increasing levels of plastic waste.

In the last 60 years, plastic has become a useful and versatile material with a wide range of applications. Its uses are likely to increase with ongoing developments in the plastic industry. In the future, plastic could help address some of the world's most pressing problems, such as climate change and food shortages. For example, plastics are used in the manufacture of rotors for wind turbines and tunnels made from polyethylene can help crops grow in otherwise unfavourable conditions. As demand for materials with certain qualities increases, the plastics industry will aim to supply them. Meanwhile, increasing plastic production and use in emerging economies looks set to continue, and waste management infrastructure will have to develop accordingly. Unfortunately, the properties of plastic that make it so valuable also make its disposal problematic, such as its durability, light weight and low cost. In many cases plastics are thrown away after one use, especially packaging and sheeting, but because they are durable, they persist in the environment. If plastic reaches the sea, its low density means it tends to remain on the surface.

Increasing attention has been paid to plastic waste by policymakers, scientists and the media and probably one of the most influential factors was the discovery of the Great Pacific Garbage Patch by Charles Moore in the late 1990s. This is a layer of rubbish floating between California and Hawaii that has been estimated to span about 3.43 million km² (the size of Europe). It is mostly plastic and contains everything from large abandoned fishing net to plastic bottles to tiny particles of plastic (or 'microplastics'). This type of mass in the seas can be known as 'plastic soup' and there are concerns that Europe hosts similar patches, in areas such as the Mediterranean and the North Sea. As such, marine litter and plastic waste is a priority on the EU policy agenda. Plastic is still a relatively new material, which means the problem of plastic waste has only recently been realized, as has knowledge about its environmental persistence (Barnes et al., 2009). Even more recent is the discovery of possible health and environmental effects, such as the impacts of the chemicals contained in plastics. The monitoring of plastic waste and research into its impacts are still in their infancy, but so far the implications are worrying.

INDIAN SCENARIO

Plastic waste is a major environmental and public health problem in Indian set up particularly in the urban areas (Tammemagi, 1999). Plastic shopping or carrier bags are one of the main sources of plastic waste in our country. Plastic bags of all sizes and colors dot the city's landscape due to the problems of misuse and overuse and littering in India. Besides this visual pollution, plastic bag wastes contribute to blockage of drains and gutters, are a threat to aquatic life when they find their way to water bodies, and can cause livestock deaths when the livestock consume them. Furthermore, when filled with rainwater, plastic bags become breeding grounds for mosquitoes, which cause malaria. We have become so accustomed to the ubiquitous presence of plastic that it is difficult to envision life when woods and metals were the primary materials used for consumer products. Plastic has become prevalent because it is inexpensive and it can be engineered with a wide range of properties. Plastics are strong but lightweight, resistant when degraded by chemicals, sunlight, and bacteria, and are thermally and electrically insulating. Plastics have become a critical material in the modern economy; the annual volume of plastics produced exceeds that volume of steel (Tammemagi, 1999). The kind of recycling practiced in India is quite different from what is practiced in the rest of the world, in that state of the art technologies are not employed here. The starting point is the sorting of plastic waste (based on colour, transparency, hardness, density and opacity

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