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Climate SAR सार

Climate Science And Research

Plastic Pollution and Climate Change

Climate Change Research Institute
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FROM EDITOR

Plastics addiction in items of our daily use is giving rise to piles of trash getting accumulated on land and oceans as Plastic waste and Marine debris. Plastic waste has a long life and remains on the landscape for several years causing environment pollution. On World Environment Day (WED) June 5, 2018, India hosted the United Nations Environment Programme (UNEP) event on "Beat Plastic Pollution".

The Climate Change Research Institute echoed WED theme and organized an Awareness and Capacity Building Workshop for youth to discuss science & technology solutions for controlling plastic pollution. A Policy Paper on 'Strategies for Controlling Plastics Pollution in India' has been brought out.

*The CCRI has started this bulletin of 'Climate Science and Research' –**Climate SAR** for wider dissemination of information about environment & climate change education. In this issue you learn about plastics and plastic facts.*

We welcome your feedback to contactus@ccri.in

Dr. (Mrs.) Malti Goel
President, Climate Change Research Institute

WHAT ARE PLASTICS?

A Plastic can be defined as a group of synthetic or natural organic materials that can be shaped when soft and hardened on cooling. Plastics include many types of resins, resinoids and cellulose derivatives. Plastics are made large molecules known as 'polymers', composed of repeated molecular segments joined together, generally end to end, to create a long chain. The smallest building block of a polymer is called a 'monomer'.

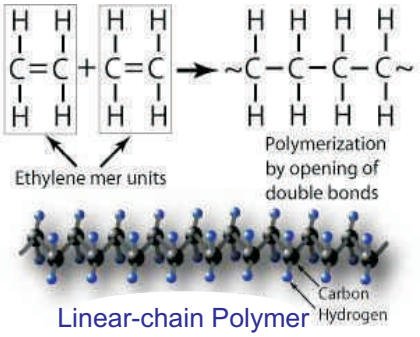
The first man-made plastic was created by 'Alexander Parkes' and was publicly demonstrated at the 1862 Great International Exhibition in London. The material was called Parkesine, which was derived from cellulose. In 1909 Leo Baekeland invented the first synthetic plastic and it came to be known as 'Bakelite'.

TWO TYPES OF PLASTICS

We can split plastics into two categories according to how they behave when heated.

THERMOPLASTICS - In a thermoplastic, the long polymer molecules are joined to one another by very weak bonds, which easily break apart when we heat them, and quickly reform again when we take the heat away. That's why thermoplastics are easy to melt down and recycle.

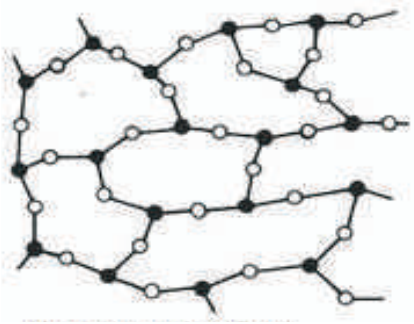
Examples are: Polyethylene/polythene - plastic bottles and sheets, Polystyrene- packaging material, Polypropylene- plastic ropes, Polyvinylchloride- toys and credit cards etc.



Linear-chain Polymer

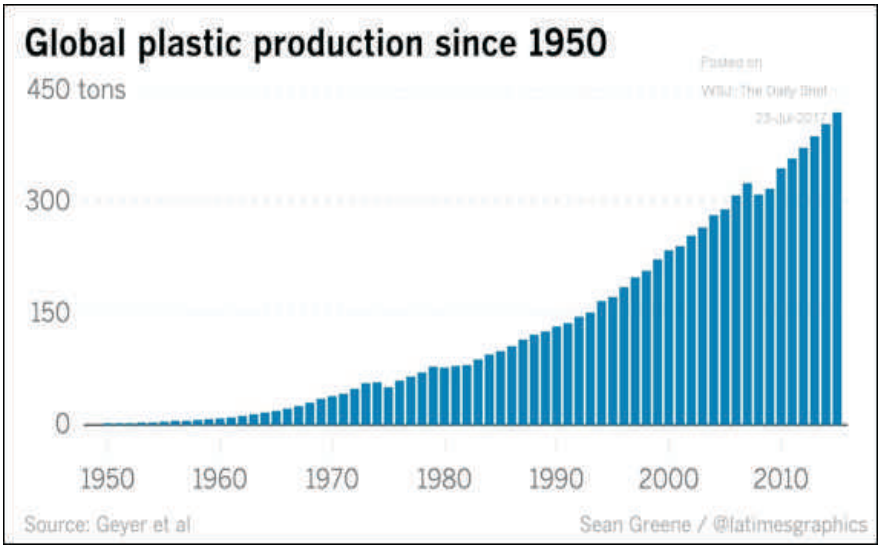
THERMOSETS - Thermosets are usually made from bigger polymer chains than thermoplastics. When they're initially manufactured, they're heated or compressed to form a dense, hard, structure with strong cross-linked binding. Thermosets cannot be remolded, once they're "set" (cured) during manufacture.

Examples are: Polyurethane- insulating material in buildings, Polytetrafluoroethylene- nonstick coatings on cooking pans, computer casings, Epoxy resin- as adhesives.

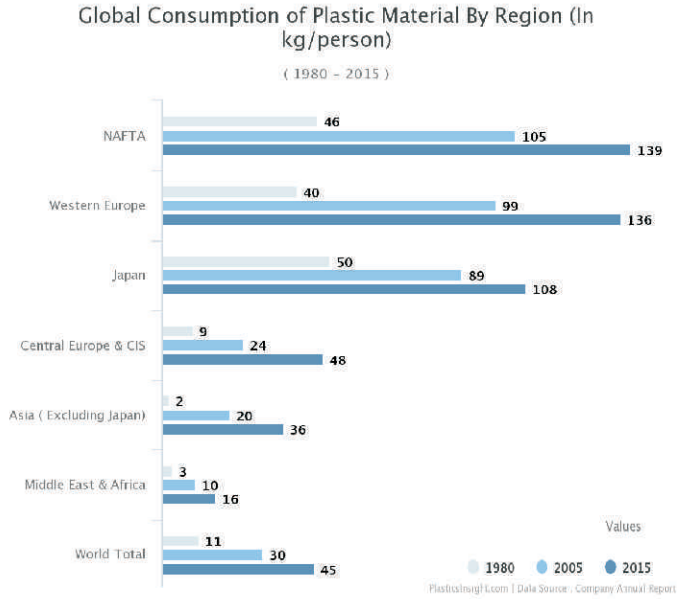

Cross-linking polymer

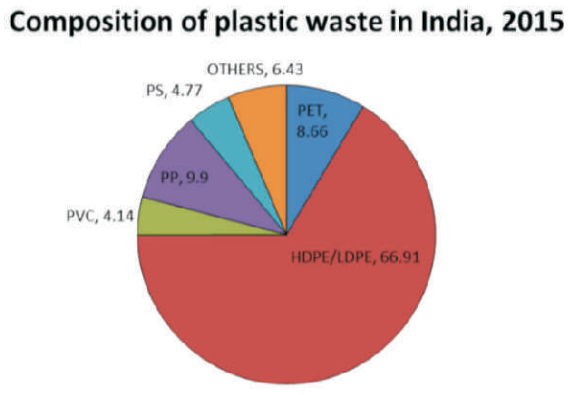
PLASTIC PRODUCTION AND WASTE GENERATION

Plastic products have become an integral part in everybody's daily life. According to the statistics of year 2018, every year about 380 million tonnes of the plastic production happens worldwide. It has broad range of applications as films, wrapping materials, shopping and garbage bags, fluid containers, clothing, toys, household and industrial products, and as building materials. Once plastic is discarded after its utility is over, it is known as plastic waste. It is a fact that plastics waste do not degrade easily and remain on landscape for several years.



Mostly, plastic waste are recyclable but, recycled products are more harmful to the environment as additives and colours are added in making them. The recycling of a virgin plastic material can be done 2-3 times only, because after every recycling, the plastic material deteriorates due to thermal pressure and its life span is reduced. Hence recycling is not a safer and permanent solution for plastic waste disposal.





Composition of Plastic Waste in India (CPCB, 2015)

PLASTIC POLLUTION

Plastic Pollution refers to the accumulation of waste, either gases or solid goes in the earth's environment which negatively affects humans and organisms. Mainly plastics are considered to be as pollutants at micro, meso, macro debris with respect to the size.

Gaseous emissions

According to the studies, plastic releases greenhouse gases when exposed to the sunlight. Plastic also contributes a lot in damaging the air quality when burnt. Most studies at various institutions and universities are carried out to determine the role of plastic pollution which is ultimately linked to the climate change. The major greenhouse gases such as methane and ethylene play an important role in affecting the environment. Methane absorbs the heat and has 21 times the global warming potential of carbon dioxide. Greenhouse gases are known to contribute to global warming & climate change, affecting sea level rise and environmental health.

Solid waste

Polyethylene terephthalate (PET) and Polyvinyl chloride (PVC) leach out diethylhxy phthalate, (DEHP), which is added to soften plastics. DEHP is highly toxic and has been strongly linked to asthma and allergies in children. It may also affect liver, kidney, spleen, bone formation and body weight. In Europe DEHP has been banned since 1999 from use in plastic toys for children under the age of three.

Polystyrene leaches styrene that migrates significantly from polystyrene containers into the contents and adversely affects human health when oily foods are heated in such containers.

Polycarbonate and new, safer, biodegradable bio-based plastics made from renewable resources such as corn and potato starch and sugar cane release many chemicals after degradation which affect the ecosystem.

PLASTIC FACTS

- **Microplastics – defined as plastic pieces of micron size have become a major concern for environmental researchers during the past decade. In a study conducted on volunteers from nine countries who kept food diaries for a week and provided stool samples up to nine different kinds of plastics were detected, ranging in size from 0.002 to 0.02 inches. The most common plastics detected were polypropylene and polyethylene terephthalate – both are major components of plastic bottles and caps.**
- **According to Greenpeace report, soft drink manufactures and beverage companies like; Nestle, Coca-cola and Pepsi Co. have been identified as top makers of plastic waste.**
- **To reduce plastic pollution, coffee chain in Singapore set off a local trend by giving its customers 10% discount, if they brought their own cups.**
- **In line of this Tamil Nadu Hotels Association announcing that its members will offer a 5% discount on take away bills if customers bring their own vessels and carrier bags is commendable and can be a win-win option.**
- **In a recent discovery a cost-effective method to convert plastic bottle waste into PET Aero-gels has been developed for use as heat & sound insulation in buildings and for many other uses.**

- **Plastic beads are well known asset to jewelers' for use in fashion Jewelry. Corian – a solid material made from an acrylic polymer is now proving a jewelry asset - stark, easy to wear and with the colours bursting from the gemstones. It makes sculptural fashion jewelry that is durable and not too flashy.**
- **Sustainable fashion wears like hats, scarves and jackets from recycled plastic bags and bottles found in the sea are catching attention of eco-fashionists in Paris. Recycled wool and polyester made from plastic bottles replacing fur or leather and shoe soles, made from recycled plastic bottles are catching fast.**

Use of Plastic Waste in Roads

India generates about 15,000 tonnes of plastic waste everyday, only 7,000-9,000 tonnes is recycled. To increase the recycling rates Government of India in 2015 made the use of plastic waste in road construction mandatory – shredded waste plastic is mixed with bitumen at high temperatures.

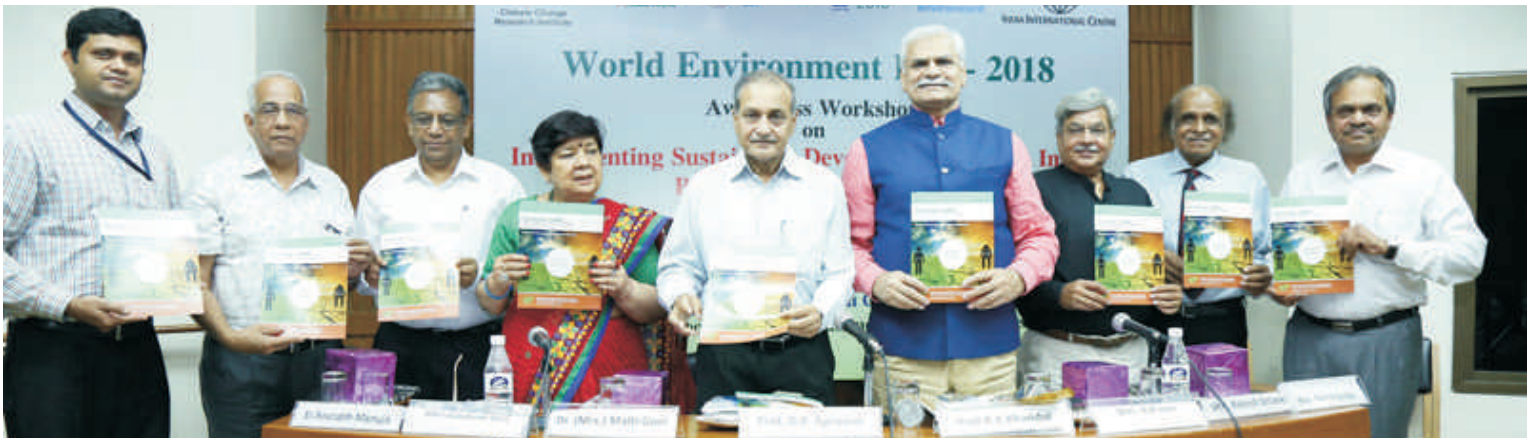
Several Indian cities – Pune, Indore, Surat, Chennai – are already constructing roads using the plastic-bitumen mix. These roads are longer lasting, and do not develop cracks and potholes, which account for one-tenth of the road deaths in the country. There are multiple benefits to mixing plastic waste into bitumen. Plastic gets recycled, instead of going into the stomachs of stray animals or the ocean bed, there is saving the cost of bitumen, and roads enable smoother rides, reducing fuel consumption and emissions, while also becoming safer and more durable. More research and new product should be a focus, such as the prefabricated roads being tried out in the Netherlands. New uses, such as railway platforms, must be explored.

Source- Economics Times Editorial

GLIMPSES OF WED - 2018

8th June, 2018 (Friday), India International Centre Annexe, New Delhi

The Climate Change Research Institute in a scientific social responsibility initiative organized a half-day Awareness Workshop on Implementing Sustainable Development Goals in India: Beating Plastic Pollution in line with the World Environment Day theme. Conducted in collaboration with Indian International Centre, New Delhi the Workshop was held on 8th June, 2018 for wider dissemination of information and education among youth about environment and climate change.



A Durga Puja pandal made of Plastic bottles in Guwahati uses 10,000 bottles. The pandal was built to raise awareness about control of land and ocean pollution caused by plastics.

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