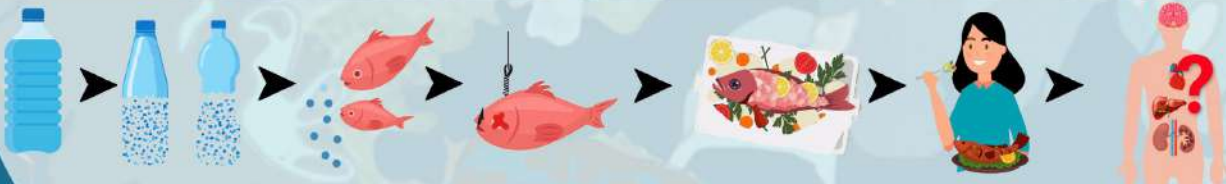


UNMASKING

PLASTIC POLLUTION

(A HANDBOOK TO MAKE YOU AWARE OF PLASTIC POLLUTION SO AS TO REDUCE ITS POTENTIAL HAZARDS)



SAY NO TO
SINGLE USE PLASTIC



Dr. Suman Mor
Dr. Ravindra Khaiwal



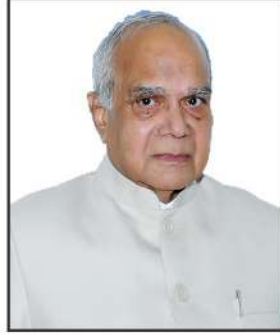
Banwarilal Purohit,

*Governor of Punjab
and
Administrator
Union Territory, Chandigarh*



*Raj Bhavan
Chandiagrh.*

July 18, 2022



FOREWORD

The use of plastic products in daily life has increased the quantity of plastic waste generation, making it a major environmental and human health concern worldwide. The problem of plastic waste is most severe in developing countries like India due to a lack of awareness among the people, who unknowingly created this threat for themselves by littering & improper disposing of the used plastic products. Plastic waste, if not recycled, pollutes the soil, air and all water resources in multiple ways. The problem of plastic pollution has emerged due to the unscientific disposal of plastic waste.

I am pleased to introduce the 'Unmasking Plastic Pollution' booklet, which comprehensively discusses the types of plastics, their uses & industrial applications. It explicitly highlights the threats of single use plastics to our earth's ecosystem and human health. It also highlights the emerging issue of microplastics, which has increased the leaching of hazardous chemicals into the environment. This pictorial booklet aims to educate readers of all age to recognize and choose a better type of plastics. Let's learn 'how you can minimize your plastic waste' and follow the rules laid by the Government of India to reduce the adverse impact of plastic waste.

I commend the effort of Dr. Suman Mor, Department of Environment Studies, Panjab University, Chandigarh & Dr. Ravindra Khaiwal, Department of community Medicine & School of Public Health, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, for bringing out the infographic booklet.

I am sure that this booklet will help to spread awareness among the public to minimize their plastic uses in order to promote a better environment and public health.

[Banwarilal Purohit]

UNMASKING THE PLASTIC POLLUTION



This booklet is based on current knowledge & may need to be updated with the emerging evidence. The authors gratefully acknowledge the support from the Ministry of Environment, Forest & Climate Change, New Delhi (India) under the “Community Environmental Empowerment Program (CEEP)” project.

Our social responsibility is to reduce the usage of plastics

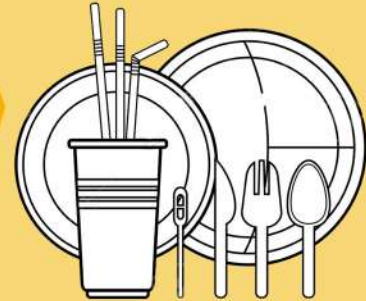
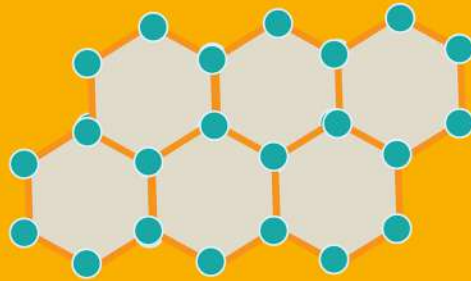
Bring your own Jute/cloth bag for shopping

Enjoy drink without plastic straw

Own reusable bottle

PLASTICS & ITS TYPES

Plastics are polymers, that are long chain molecules, made from smaller molecules called monomers. The basic raw materials for plastic are petroleum & natural gas.



Categories of Plastics

THERMOPLASTICS

Thermoplastics make about 80% of plastics used today.



The heating & cooling cycle can be repeated for times makes these plastics suitable for recycling.

THERMOSETTING

Thermosets make up remaining 20% of plastics used.



These once shaped or formed cannot be softened by applying heat.

Coding of Plastics



PET

Polyethylene terephthalate



PE-HD

Polyethylene (High Density)



PVC

Polyvinyl chloride



PE-LD

Polyethylene (low density)



PP

Polypropylene



PS

Polystyrene



0

Bisphenol A & Other

SAY NO TO SINGLE-USE PLASTIC



PLASTICS & ITS TYPES

Plastics are identified by their resin identification code (RIC), which is listed on product.

This coding system is administered by American Society for Testing & Materials (ASTM)

Polyethylene Terephthalate



Lightweight, transparent & smooth

Consumer food service products & single use only

Risk of leaching phthalates

Phthalates can damage liver, kidney, lungs & reproductive organs



High Density Polyethylene



Heavy, opaque & hard

It is long lasting & durable

Safe for reuse

Low risk of leaching & withstand high temperatures



What is Leaching?

Leaching is the transfer or leakage of chemicals from plastic to the food/beverage it holds.

This effect is mainly due to the plastic spread in the surrounding environment, mainly on the surface of the earth & in the water.



HIGH TEMP.



WITH TIME

SAY NO TO SINGLE-USE PLASTIC

PLASTICS & ITS TYPES



PVC (Polyvinyl Chloride)

It can break down into dangerous chemicals like vinyl chloride.

Vinyl Chloride is cancerous.



Its light weight



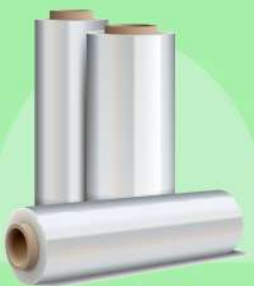
For single use only



Risk of Leaching



Withstand temperatures



PP (Polypropylene)

It can be reprocessed into bins, bike racks, ice scrapers, & brooms.



Safe to be reused



High melting point



Lightweight



Used for liquids



Low-density Polyethylene

LDPE can be reprocessed into trash can liners, composite lumber, & piping. A very low risk of leaching chemicals.



Safe to be reused



Very flexible



Lightweight



They should be rinsed well & dried before collection.

PLASTICS & ITS TYPES



Polystyrene

Polystyrene is not safe to be micro waved or heated.



STOP PLASTIC POLLUTION



LIGHTWEIGHT



VERSATILE

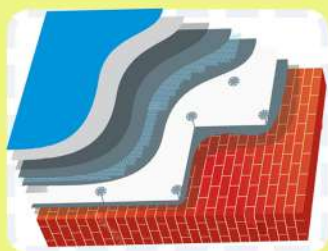


SINGLE USE



CHEAP

It contains the chemicals styrene & benzene. These chemicals can transfer to foods & drinks if not used properly. These chemicals are known carcinogens.



Other (Acrylic, Nylon, Fiberglass, Compostable Plastics)

Made of various plastic resins making it difficult for curbside, recycling programs to accept.



Water bottles, CDs & DVDs, bullet-proof materials, sunglasses, telephone, MP3 player & computer cases, signs & displays, clothing.

5 Gallon Water Jug

Bulk Food Containers

Include compostable & biodegradable plastics like polylactide through to acrylic, nylon & polycarbonate.



Compostable Cups

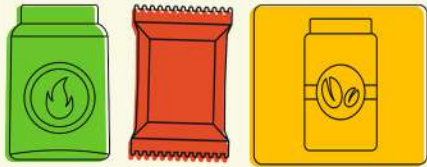


SAY NO TO SINGLE-USE PLASTIC

PLASTIC USES & ITS ROLE IN INDUSTRY

In Packaging & Storage

Plastics have revolutionized packaging by providing light, strong & flexible packaging materials.

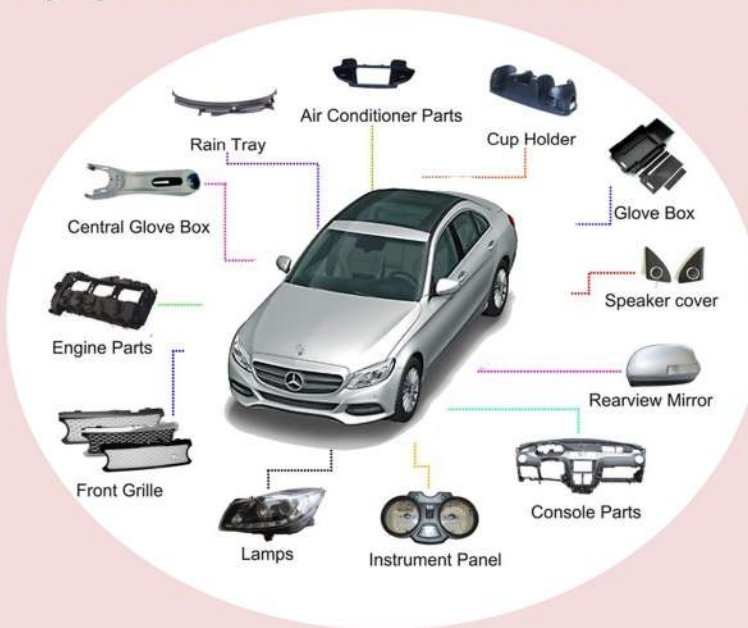


Bottled water with seal reduces risk of water contamination.



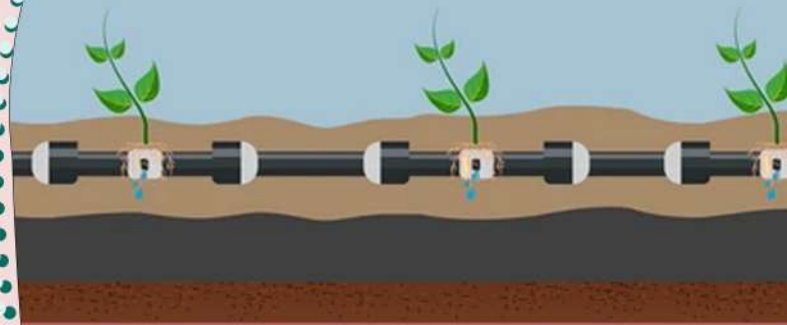
In Transportation

Durable, light weight & corrosion resistant plastics offer fuel efficient & high performance cars at lower cost.



About 12 tonnes of oil is saved each year by using light weight plastic vehicle components.

In Agriculture



- Plastics is also used in irrigation pipes, tube wells & water storage tanks.
- Drip irrigation uses permanently installed plastic tubes to feed water directly to plant roots.

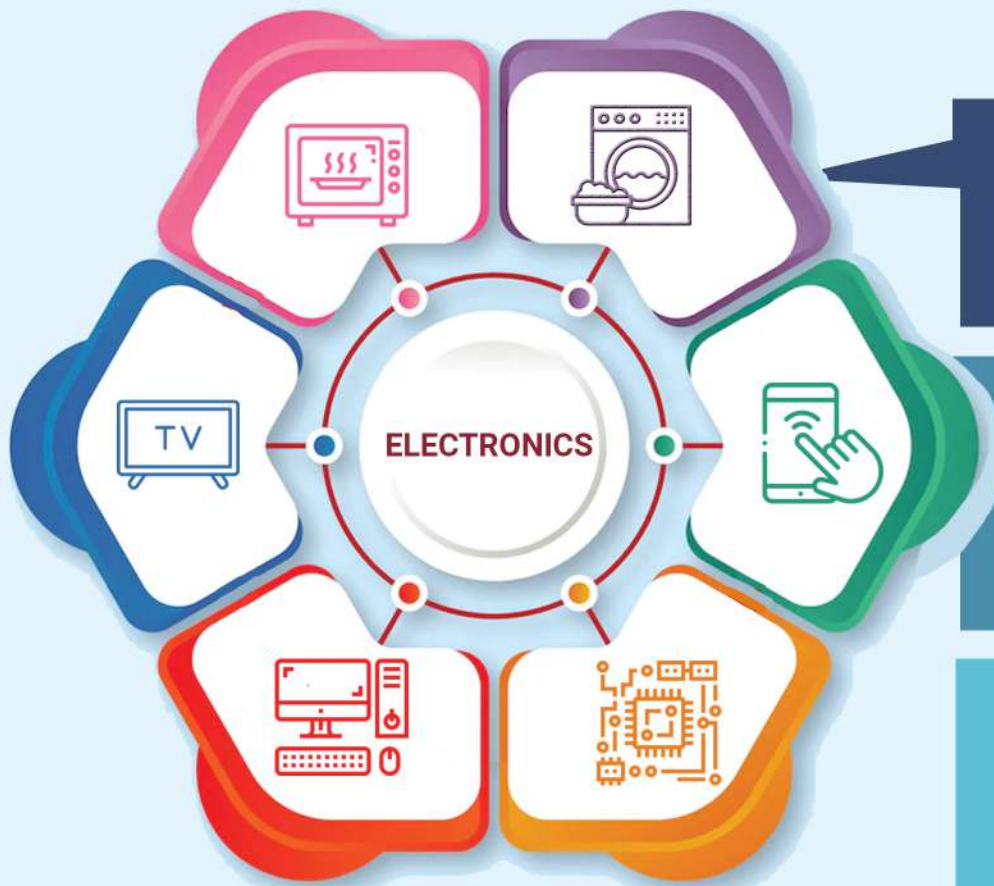
Though Plastic is very useful. But its improper disposal is causing hazard.

In Biology & Medicine



Plastic is used in various medical products such as disposable syringes, blood bags, urine bags, surgical drapes & various machines.

PLASTIC USES & ITS ROLE IN INDUSTRY



In Electronics

The electrical & electronics sector is an important & growing market for plastics.

Versatility of plastics combined with durability, strength & cost effectiveness make it the ideal material for:

Microwaves, washing machines, television sets, cables, computer, mobile phone, circuit board etc.

Construction & Building

It is an important & growing market for plastics.



Plastic doors & windows are very popular substitute of wood, metal & glass.



They are tough, long lasting, resistant to rusting & termite proof.



PVC panelling & down fall ceiling.



Online shopping & Food

- The pandemic has exacerbated the consumption of single-use plastics of the restaurant industry due to the growing preference for food delivery service & concerns about safety & hygiene.
- Home delivery by restaurants has given a big boost to the consumption of single use plastics due to the Covid-19 pandemic & sanitation.



WHY WE NEED TO RECYCLE PLASTIC?

Plastic recycling is the process of taking scrap or waste plastics & recovering the material for use in manufacturing.

RECYCLING 1 TONNE OF

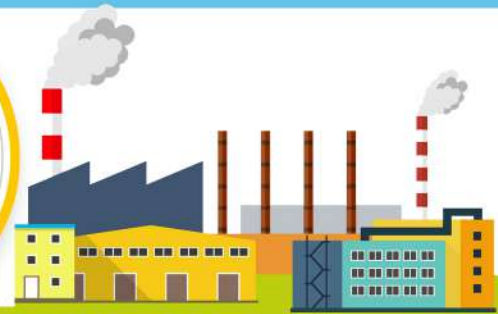
plastic bottles saves 1.5 tonnes of carbon emissions.



plastic bottles saves 7.4 cubic yards of landfill space.



Recycling provides a reliable, cost effective feed stock to plastic industry.



Plastic containers get turned into new products at a much lower rate than glass bottles.



Manufacturing plastics from recycled materials use only 30% of the energy required to make virgin plastic products from fossil fuels.

Reliable

Cost Effective

Creates Jobs



PLASTIC WASTE



WHY CAN'T ALL PLASTICS BE RECYCLED?

: COMMON PROBLEMS WITH RECYCLING



The economics of recycling plastics are not always favourable. Identification of the type of Plastic & Segregation at source is the solution.

Residence time of Plastics



Plastic Bag
20 YEARS



Coffee Cup
30 YEARS



Plastic Straw
200 YEARS



Plastic Rings
400 YEARS



Plastic Bottle
450 YEARS



Plastic Pod
500 YEARS



Disposable Diaper
500 YEARS



Plastic Toothbrush
500 YEARS

SAY NO TO SINGLE-USE PLASTIC

PLASTIC USES & ITS HARMFUL EFFECTS

Air Pollution: Due to burning of plastic waste, various poisonous gases are emitted into atmosphere, poses a threat to vegetation, human, birds & animals.

Burning of plastic emit **carcinogenic gases** dioxin/furans.



HUMAN HEALTH PROBLEMS



Soil/Land Pollution: Plastics are a major problem on land, too. Eaten by animals & birds, making them sick, interference of dumped plastic waste in soil ecosystem, release of toxins to groundwater due to leachate formation.



EATEN BY ANIMALS



EATEN BY BIRDS



LEACHATE



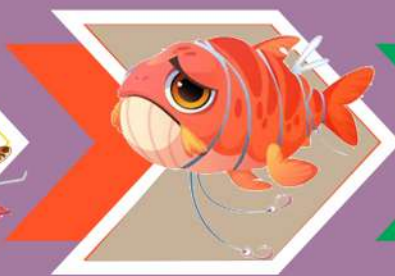
ENTANGLED BIRD

Water Pollution:

- ★ Entanglement of aquatic animals in rivers & oceans.
- ★ Eaten by aquatic animals, making them sick.
- ★ Release of toxins into water due to dumped plastic waste.



EATEN BY TURTLE



TRAPPED FISH



BLOCKING OF SEWAGE SYSTEM



INFECTIOUS DISEASE

SAY NO TO SINGLE-USE PLASTIC



PLASTIC WASTE & ITS HARMFUL EFFECTS

- Disposing plastic into water body risks marine life.
- Open disposal pollutes water bodies making it unfit for use. Human can have an alternate source but animals don't.



Burning of plastic releases toxic chemicals in air



Use of plastic has left a huge carbon footprint on earth



Contain endocrine disruptor & cancer causing substances

Plastic forms a layer within the soil which prevents rainwater from percolating into ground, resulting in groundwater scarcity



Soil fertility get affected due to PLASTIC WASTE



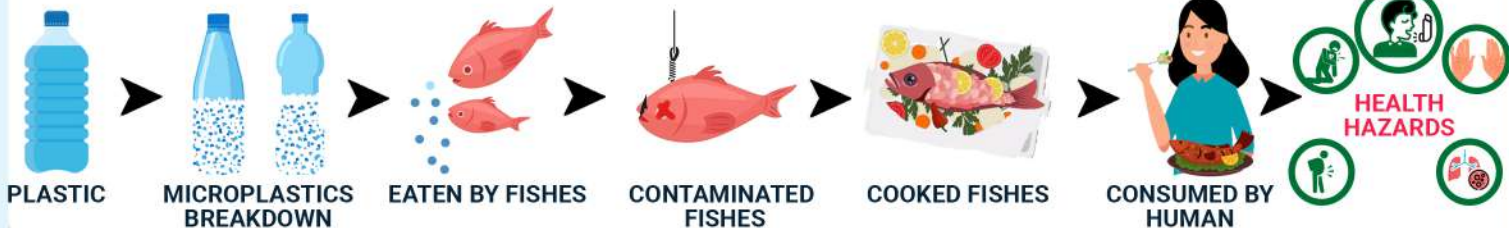
Leaches toxins into food & drinks

Contaminates our food chain



Plastic is made from fossil fuels

Plastic degradation takes several hundred of years



PLASTIC POLLUTION & ITS HARMFUL EFFECTS



PLASTIC POLLUTION & ITS HARMFUL EFFECTS

1,400 times the weight of the **Great Pyramid of Giza**



367 million metric tonne of plastic have been produced till 2020



12 % plastic waste has been burned



Only about **9 %** of plastic waste has been recycled



79 % wound up in landfills

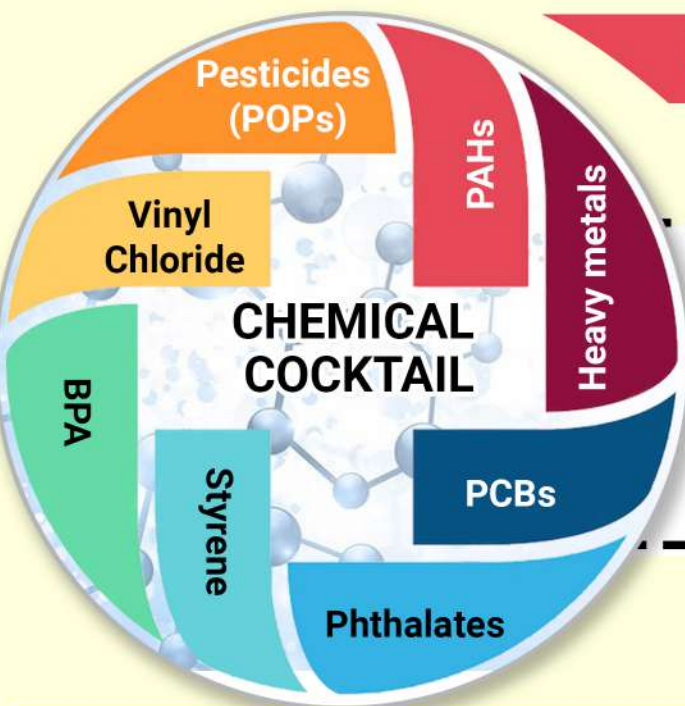


Not all plastic is **RECYCLABLE** & not all recyclable plastic is **RECYCLED**.



NON RECYCLABLE WASTE

Harmful chemicals associated with plastics



Ingredients of plastic materials



Byproducts of manufacturing



Chemicals adsorbed from environment



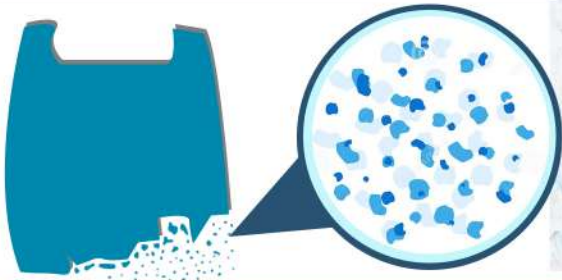
These chemicals have very high life span in environment & cause damages to human organs, cancer, hormonal disorder, reproductive disorders if ingested in any pathway by humans.

SAY NO TO SINGLE-USE PLASTIC



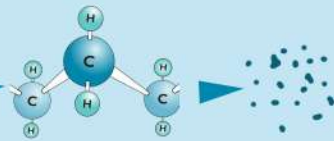
MICROPLASTICS

: SMALLER PIECES & BIGGER PROBLEMS



Microplastics are tiny plastic particles that result from both commercial product development & the breakdown of larger plastics.

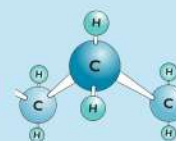
Slow fragmentation
by **Direct Sunlight**



Slow fragmentation
by **Weathering**



MICROPLASTICS

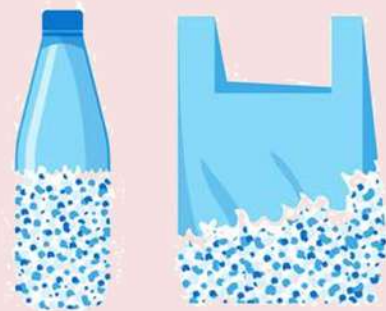


PRIMARY MICROPLASTICS



These are tiny particles > 5mm in diameter designed for commercial use, such as cosmetics, as well as microfibers shed from clothing & other textiles, such as fishing nets.

SECONDARY MICROPLASTICS



These are particles size from 0.5mm to 5 mm in diameter that result from the breakdown of larger plastic items, such as water bottles.

Microplastics have entered the food chain. Now its presence in many food sources:



600 particle microplastics per kilogram of salt



660 microplastic fibers per kilogram of honey



109 microplastic fragments per liter of water

MICROPLASTICS

: A THREAT TO THE FOOD CHAIN

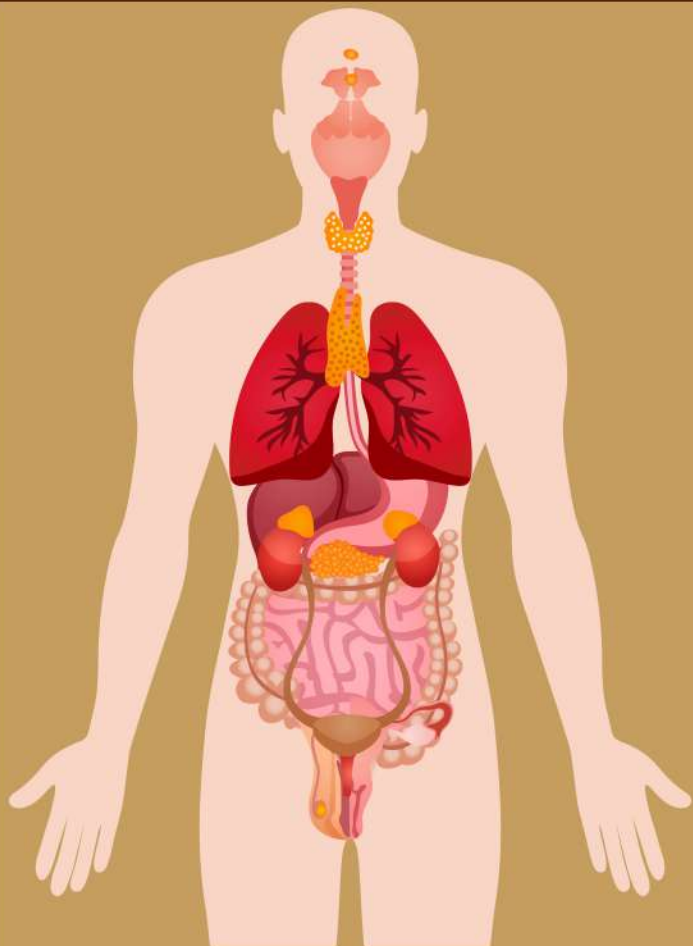
Slow fragmentation in deep oceans/ rivers



Due to increasing use of plastic globally, high levels of microplastic have entered the food chain



Microplastics are known endocrine disruptors & are implicated in numerous health challenges like :-



OBESITY



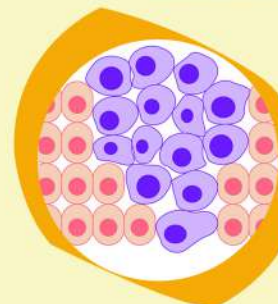
DIABETES



ENDOCRINE DISRUPTION

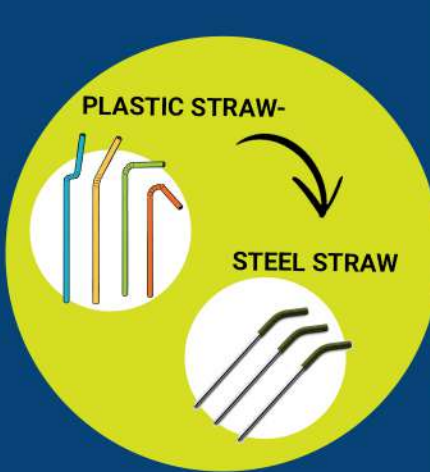


CANCER



SAY NO TO SINGLE-USE PLASTIC

SINGLE USE PLASTIC: SANCTION & PUNISHMENT



Single-use plastics (SUPs) refer to disposable items like grocery bags, food packaging, bottles & straws that are used only once before they are thrown away, or sometimes recycled.

SUPs degrade & become microplastics & combine to pollute the environment. So from July 1, 2022, 19 single use plastic items have been banned.

OUR OCEAN CONSIST OF **72.4% SINGLE-USE PLASTICS**



PENALTY FOR NON-COMPLIANCE OF SUP BAN:

RULE	PROVISIONS	VIOLATORS	PENALTY
4(C)	Carry bag made of virgin or recycled plastic of any size or thickness	Producer	Seizure of the products. Closure of the unit Per ton of bags manufactured 1st time violation Rs.5,000/- 2nd time violation Rs.10,000/- 3rd time violation Rs.20,000/-
4(d)	Plastic sheet or like, which is not an integral part of multi-layered packaging & cover made of plastic sheet used for packaging, wrapping the commodity shall >50 microns	Producer	Seizure of the products. Closure of the unit Per ton of plastic used in packaging of tobacco products 1st time violation Rs.5,000/- 2nd time violation Rs.10,000/- 3rd time violation Rs.20,000/-
14(1)	Retailers or street vendors shall not sell or provide commodities to consumer in carry bags or plastic sheet or multilayered packaging, which are not manufactured & labelled or marked	Retailer/ Street Vendors	Seizure of the products. For the 3rd time violation penalty plus seizure of trade documents Retailer: 1st time violation Rs.2,000/- 2nd time violation Rs.5,000/- 3rd time violation Rs.10,000/- Street Vendor: 1st time violation Rs.200/- 2nd time violation Rs.500/- 3rd time violation Rs.1000/-

FOR VIOLATORS

5 Years jail time or Rs. 1 Lakh Fine

Maximum punishment for people who fail to comply with or contravenes any of the provisions of the Environment Pollution Act

CHOOSE TO REFUSE SINGLE-USE PLASTIC

SAY NO TO SINGLE-USE PLASTIC



AVOID SINGLE USE PLASTICS

: BANNED PLASTIC ITEMS



Single use plastic cutlery (Plates, cups /glasses, bowls, forks, knives, spoons, stirrer & straw), thermocol/Styrofoam Cutlery.



Use of plastic material for decoration purpose (such as wrapping/packing sheets, frills, garland, confetti, party bloopers, plastic ribbons, etc.)



Polythene, use of decorative thermocol, single time use razor, drinking water sealed glasses & water pouch, industrial packaging > 50 microns.



PVC Banners > 100 microns



Cigarette packet, Invitation cards

Plastic Bag/Pouch for packaging food items (sold in the name of silver/ aluminium).



Single-time use pens



Non-woven polypropylene bags



Plastic sticks



Plastic pouch/ sachet



75 MICRONS IN THICKNESS W.E.F. 30th SEPTEMBER 2021

120 MICRONS IN THICKNESS W.E.F. 31th DECEMBER 2022

AVOID SINGLE USE PLASTICS

: ALLOWED PLASTIC ITEMS



Plastic material having thickness of 50 micron & above, used for wrapping the material at the manufacturing stage or integral part of manufacturing.

PLASTIC FOR DOMESTIC PURPOSE



Other Plastic Products



Virgin Plastic bags used for milk having thickness not less than 50 micron.



Paper based carton packaging using one or more layer of plastics.

Use of Plastic for packaging of medicine, medical equipments & medical products.

SAY NO TO SINGLE-USE PLASTIC



GOVERNMENTS INITIATIVES FOR PLASTIC FREE INDIA



PM Modi's Independence Day speech: Call against single-use plastic can be a start.

India undertook a nationwide awareness campaign to clean plastic & other waste from coastal areas.



PLASTIC FREE INDIA-2018

India generates 3.5 million tonnes plastic waste annually!!

Union Environment Minister Launches Awareness MASCOT 'PRAKRITI' & GREEN INITIATIVES for Effective Plastic Waste Management.

Plastic Hackathon 2021 : Information about plastic alternatives to citizens, reduction of single use plastic products, Plastic Waste Management Amendment Rules 2021 notified.

Provision for complete ban & punishment on 19 single plastic goods from July 1, 2022



Extended Producer Responsibility (EPR) Portal for Plastic Packaging (CPCB)



Download the app now!

Become our Environment warrior

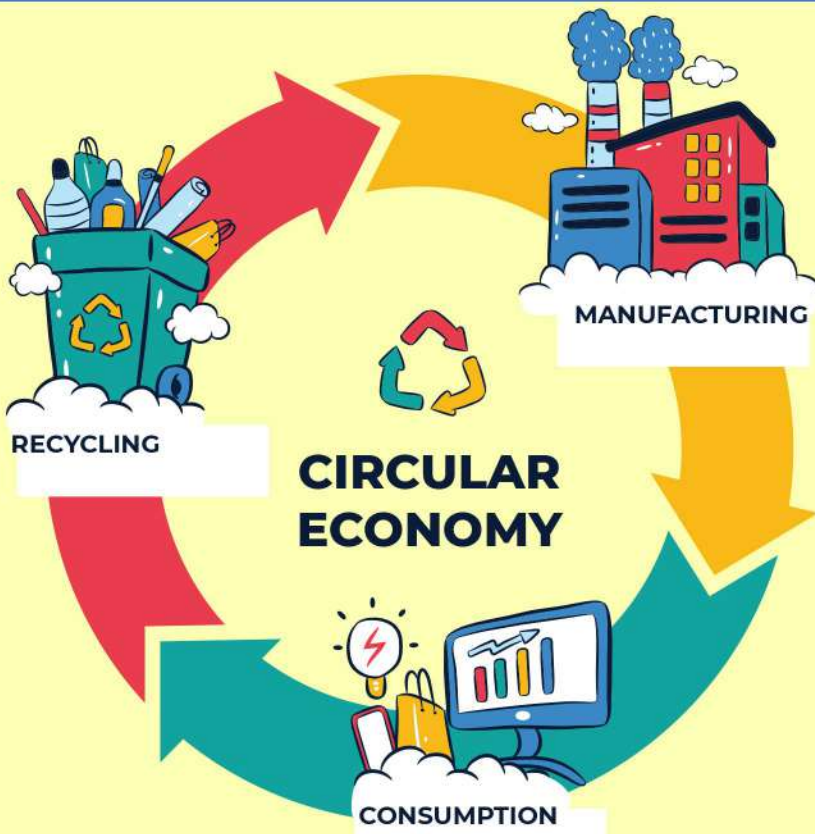
<https://play.google.com/store/apps/details?id=com.supcpcb>

Mobile App for Single Use Plastics Grievance Redressal (CPCB) to empower citizens to check sale/usage/manufacturing of SUP in their area & tackle the plastic menace.

SAY NO TO SINGLE-USE PLASTIC



GOVERNMENTS INITIATIVES FOR PLASTIC FREE INDIA



It is simple, if we all reduce the amount of waste we produce, reuse more of the products we already have & recycle as much as possible, we will dramatically reduce our waste.

Charge on polythene bags should be kept to ensure that polythene bags will no longer be handed out for free by shopkeepers.

A small deposit can be charged for the plastic bottles. This way even if some individual litter, there is an incentive for others to pick up the bottles & return them.

Support to states under Swachh Bharat Abhiyan

BUILD ABOUT 9000 ROADWAYS BY PLASTICS REPROCESSING & PROMOTE INNOVATION

“Swachh Sagar, Surakshit Sagar” is a Coastal Clean-Up 75-days campaign to reduce 1500 tonnes of Marine Litter launched by the government to clean up 7500 km coast line of 75 beaches.

The illustration shows a beach cleanup scene. A superhero character stands on the left with a **DO NOT LITTER** sign. Children are participating in the cleanup, with one boy pushing a cart full of plastic bottles. There are four recycling bins: **DRY WASTE** (blue), **WET WASTE** (green), **HAZARDOUS WASTE** (black), and a **NO PLASTIC BAGS** sign. Text boxes provide information about biodegradable plastics and tiny plastic fibers.

DO NOT LITTER

Biodegradable plastics are plastics that can be decomposed by the action of living organisms, usually microbes, into water, carbon dioxide, & biomass.

Tiny plastic fibers – are the most common type of plastic waste found in the environment.

NO PLASTIC BAGS

DRY WASTE

WET WASTE

HAZARDOUS WASTE

SAY NO TO SINGLE-USE PLASTIC



THE PLASTIC SOLUTION STARTS WITH YOU!



Use glass or ceramic bowls to heat food in the microwave.



Allow food to cool to room temp. before putting into plastic containers.



Eat fresh foods as much as possible.



Use cloth or canvas bags for shopping.

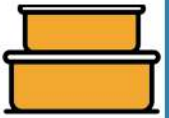
Reduce fast foods & packaged or processed foods.



Use glass or stainless / ceramic / wood / steel / earthen containers for storage of food & drinking water.



Consider reusable containers e.g. goods with minimal packaging.



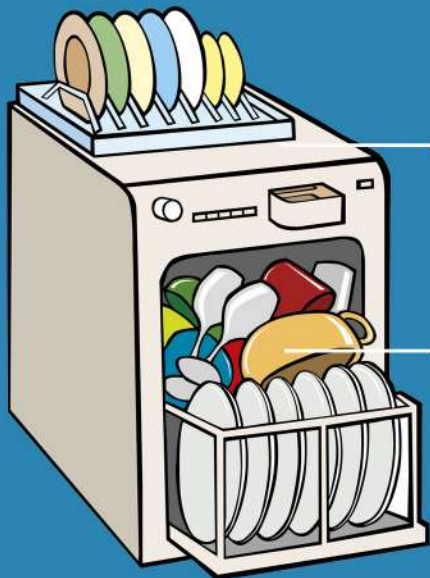
Packaging industries should minimize plastic packaging.



Choose clothes made of Cotton & other Natural Fabrics.



Avoid Clothes made of synthetic fibers.



Avoid putting plastic containers in dishwasher.

They leach chemicals onto other dishes in the dishwasher.

Hand-wash plastic containers.

PENALTY

FIRST OFFENCE

₹5,000

SECOND OFFENCE

₹10,000

THIRD OFFENCE

₹25,000 Fine & 3 Months Imprisonment

Complete the recycling loop by buying the plastic recycling products.



Alternates for SUPs

Plastic sticks by Wooden sticks



Plastic Flag by Cloth flag



Plastic wrapping by Cellulose film



Plastic packaging by recycled paper/cardboard



Plastic cutlery by steel, ceramic, wood etc.



SAY NO TO SINGLE-USE PLASTIC



UNMASKING THE PLASTIC POLLUTION

Let us say
**NO to
PLASTICS**

Reduce soil fertility



Fossil fuels byproduct



Food chain risk



Leaches toxins



Hormones disruption



Threat to marine life



High carbon footprints



Release air toxins



Threat to ocean



Non Biodegradable

#SwachhSagarSurakshitSagar

Microplastic & single use plastic has emerged a major threat to the environment & human health. This booklet aims to unmask the plastic pollution & engage you to say no to plastic pollution & stop using single use plastic. Let's be the part of the solution not pollution.

About the Authors



Dr. Suman Mor

Chairperson & Associate Professor
Department of Environment Studies
Panjab University
Chandigarh -160014, India



Dr. Ravindra Khaiwal

Professor of Environment Health
Department of Community Medicine &
School of Public Health PGIMER
Chandigarh -160012, India

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ISBN: Applied

First Edition: July 2022

