

PLASTIC POLLUTION & ENVIRONMENT

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WHAT IS PLASTIC ?

- Plastics are synthetic material
- Usually made from oil or natural gas
- Plastics are made by linking thousands of monomers (like bisphenol-A (BPA) and vinyl chloride, are harmful and toxic).
- The main types are :
 - Polyethylene (**bottles, jars, bags, cups**)
 - Polystyrene (**cups, pellets**)
 - Polypropylene (**bottle caps, drinking straws**)
 - PVC (**shoes, pipes, furniture**)

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PLASTICS

Various **organic compounds** produced by **polymerization** capable of being moulded, extruded, cast in to various shapes and films, or drawn in to filaments, and then used as textile fibres are known as "**Plastic**".

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PLASTIC - HISTORY

Scientists contributed towards the development of plastics

The world's first fully synthetic plastic was bakelite, invented in New York in 1907 by Leo Baekeland who coined the term 'plastics'. Many chemists have contributed to the materials science of plastics, including Nobel laureate Hermann Staudinger who has been called "the father of polymer chemistry" and Herman Mark, known as "the father of polymer physics".

11/8/2024 [Leo Baekeland](#)11/8/2024 [Hermann Staudinger](#)11/8/2024 [Herman Mark](#)

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Plastic - History

- In 1907, Belgian-American chemist Leo Hendrik Beckland,
- While producing synthetic Varnish stumbled upon a new formula for a new synthetic polymer originating from coal tar
 - which he named as “Beckelite”;
 - Beckelite once formed could not be melted.

Plastic - History

- In 1909 Beckland coined “plastic” as the term to describe this *completely new category of material, which was moldable.*
- The first patent for [polyvinyl chloride \(PVC\)](#),
 - as substance now used in vinyl siding and water pipes was registered in 1914;
- [Cellophane](#) was also discovered during this period.

Plastic - History

- Plastic did not take-off until the First World War (28 July 1914 to 11 November 1918) when plastic served as a *substitute* for wood, glass, metal during the hardships.
- After World War II (1 September 1939 – 2 September 1945) newer plastic such as
 - polyurethane,
 - polyester,
 - silicones,
 - polypropylene,
 - polycarbonate joined polymethyle methocrylate and
 - **polystrene and PVC** started to be used in widespread applications.

Plastic - History

- Terylene, Dacoron cloth; Hawai Chappals getting popularized in early 1960s.
- Many more plastic related products followed by the end of 1960s when it was every ones reach due to their inexpensive cost.
- With this we entered in to a Plastic Age and it was considered as
 - “**common**”, a symbol of consumer society.

Plastic - History

- Since, the **1970s** we have witnessed the advent of “high tech” plastics used in demanding fields such as **health, aviation and technology**.
- New types and forms of plastics, with new or improved performance characteristics, continued to be developed even now.

Thermoset & Thermoplastic

- Thermoset is a material that strengthens when heated but cannot be re-moulded after initial forming. Rigid and hard
- Thermoplastics can be reheated, re-moulded, and cooled as needed without causing any chemical changes. Fleible an & Soft

MAGNITUDE OF PLASTIC PROBLEM INCREASING

- Rapid and substantial increase in anthropogenic debris on the ocean surface and beaches over recent decades.
- Global plastic production has increased from 5million tons to over 250 million tons current.
- Because
 - Inexpensive
 - Light weight
 - Strong
 - Durable
 - Easy to use
- **About 3 metric tones of plastic is estimated to be entering the oceans every 15sec.**

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PLASTICS



It keeps things airtight, which is ideal for keeping food fresh.

It is waterproof so nothing leaks out or drips in.

It can be made into a range of items from chairs to cars, dice to drainpipes.

It can even be used in craft and art work!

Did you know?

The word 'plastic' comes from the Greek word 'plastikos' which means 'fit for moulding'.

Discuss it

Talk about the other uses of plastic with adult of sibling.

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Plastic - Properties

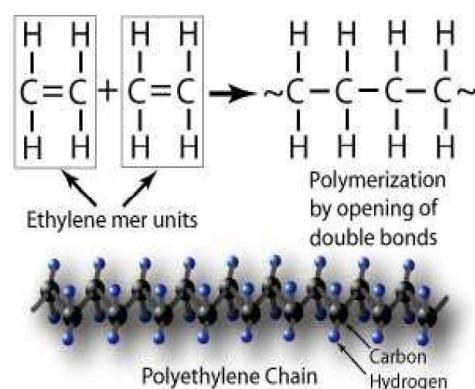
- Plastics – a synthetic polymer , are a sub-species of a class of materials known as polymers composed of large molecules formed by joining many, often thousands of smaller molecules (monomers) - polyethylene, polyvinyl chloride , polystyrene, etc. together.

Plastic - Properties

- These low molecular weight monomers precursors, organic materials, which are mostly derived from petroleum, coal tar that are joined together by a process called “polymerization”.

Plastic – Structure

- A **polymer** is composed of many simple molecules that are repeating structural units called Monomers.
- A single Polymer molecule may consist of hundreds to a million monomers and may have a linear, branched, or network structure.



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PLASTIC – STRUCTURE

- These polymers are:
 - easily molded into complex shapes,
 - stiff and hard or **flexible and soft**,
 - have high chemical resistance and
 - more or less elastic.
- These properties have made plastic very popular in many durable and disposable goods and packaging materials.
- Unfortunately, the same useful qualities have made plastic a huge pollution problem, especially when not disposed off properly.

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PLASTICS – USE

- Because of,
 - low cost,
 - light weight and strong
 - Versatile Durable
 - Plastics use has rapidly increased and it replaced other materials such as metals and glass.
- Different forms of Plastic is used in millions of items, including cars, aircrafts, bullet proof vests, toys, hospital equipments, food containers and water and milk sachets.

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Use of Plastics

World-wide statistics on plastic use indicate that perhaps it is time for some change in our attitude.

In India, per person use is 2 kg; in Europe 60 kg and in US astonishing 80 kg !!!

Every year, 500 million plastic bags are used world-wide

Over 1,000,000 kg of plastic bottles were recycled in year 2010, representing a five-fold increase in the amount of plastic recycled the previous decade.

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Plastics in India

- Our history makes it evident that the Indian plastics industry made a vigorous beginning in 1957 with the production of polystyrene.
- Thereafter, significant progress has been made, and the industry has grown and diversified rapidly.
- The industry spans the country and hosts more than 2,000 exporters.
- In 1979, “the market for plastics” was just being seeded by the state-owned Indian Petro-Chemicals, and it was only in 1994 that plastic soft drink bottles became a visible source of annoyance.

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PLASTIC WASTE AND POLLUTION



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PLASTIC--serious environmental problems

- Plastic, one of the few new chemicals/ products which introduced in the later half of this century during the seventies on large scale has become so popular that it is posing serious environmental problems.

Environmental Impact of Plastics

1. Health Impacts
2. Air & Water Pollution
3. Land Pollution
4. Impact on Wildlife
5. Marine Pollution

IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (5. WILDLIFE ISSUES)

- 1. Effects in Cattles**
 - a) Ingestion by Cattles
- 2. Entanglement**
- 3. Effects in Marine Animals**
 - a) Effect in Corals
 - b) Impacts of Fishing Gears (Ghost Fishing)
 - c) Ingestion by Marine animals
- 4. Effects in Birds**
- 5. Spread of Invasive species**

• Over 1 000 000 sea birds, 100 000 marine mammals and 1000s of turtles are killed by plastic every year.

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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

- 1. Effects in Cattles**
 - a) Ingestion by Cattles



IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

1. Effects in Cattles

a) Ingestion by Cattles



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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

2. Entanglement



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World Oceans Day 2015
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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

3. Effects in Marine Animals

a) Effect in organisms



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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

3. Effects in Marine Animals

a) Effect in Corals



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Impact of Plastics on Biodiversity- Animals (Wildlife Issues)

3. Effects in Marine Animals

- a) Effect in Corals
- b) Ingestion by Marine animals



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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

3. Effects in Marine Animals

- a) Effect in Corals
- b) Ingestion by Marine animals
- c) Impacts of Fishing Gears (Ghost Fishing)



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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

4. Effects in Birds



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IMPACT OF PLASTICS ON BIODIVERSITY- ANIMALS (WILDLIFE ISSUES)

5. Spread of Invasive species



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World Oceans Day 2015

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→ The ocean is also heavily polluted with plastics released from ships and rivers that flow into the ocean.

→ Dead beached whales are commonly found with stomachs full of plastic bags.



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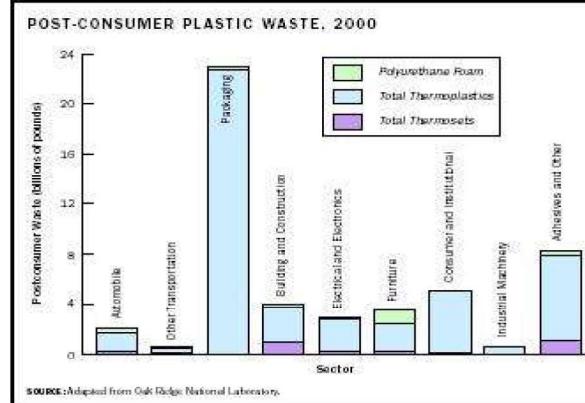
WILDLIFE ISSUES



Plastic wastes

An estimated 15 lakh computers and 30 lakh mobile phones are disposed off every year in India.

Generate e-waste like lead, brominated flame retardant and chromium, which is carcinogenic.



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Plastic bag waste & pollution

- Given India's poor garbage collection facilities, tons of plastic bags litter the urban landscape, railway tracks, chocking drains (remember Mumbai Floods a few years back!!!), preventing rainwater from seeping into ground.
- Extrapolation of plastic waste generation data from 60 major cities showed that around 25,940 tonnes of plastic waste per day (TPD) is generated in India

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PLASTIC BAG WASTE & POLLUTION



PLASTIC BAG WASTE & POLLUTION



PLASTIC BAG WASTE & POLLUTION

- A large quantities of plastic bags washed down the drains during rain clogging the drainage system.
 - causing floods in town and big cities.
- These plastic bags ultimately end up in the sea affecting adversely the sea life.
- The cheap recycled bags contain **chromium, cadmium or lead** based chemicals, especially coloured bags harmful to health –
 - they leach in to vegetables, meat, food items causing health hazards.

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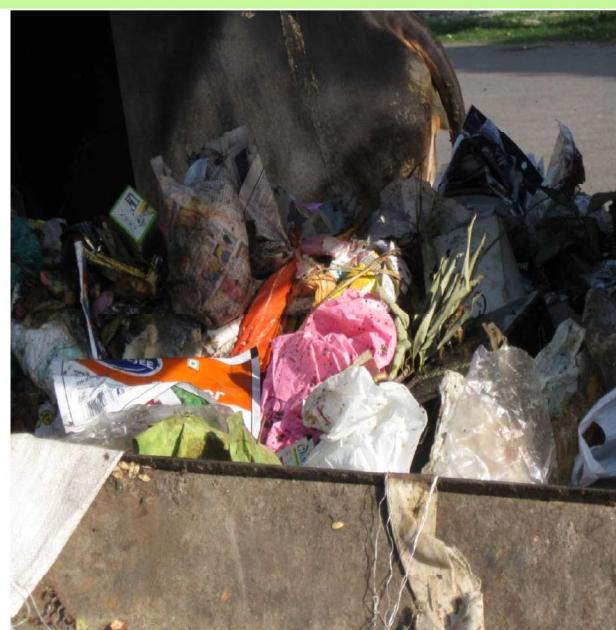
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PLASTIC BAG WASTE & POLLUTION

Every year, around 500 billion plastic bags are used world-wide - so many that over one million bags are used every minute.

India's consumption of plastic bags is one of the highest in the world



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PLASTIC USE IN INDIA

- Federation of Indian Chambers of Commerce and Industry study estimates that in 2017-18 alone,
- **India consumed 16.5 million tonnes of plastic.**
- Worse, according to industry body FICCI, 43 per cent of India's plastics are used in packaging and are single-use plastic.
- **Also, the plastic processing industry is estimated**
 - to grow to 22 million tonnes (MT) a year by 2020 from 13.4 MT in 2015 and
 - nearly half of this is single-use plastic,

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CATTLE AND PLASTIC BAGS

- There is a ‘Waste nothing’ attitude that still prevails.
 - but it is at odds with the ‘modern’ attitude of excessive consumerism.
 - and the scads of discarded plastic in city and rural areas.
 - are plaintive evidence of a [lack of awareness and safe disposal](#) infrastructure to manage the menace.
- **Hundreds of cows die every year when they choke on plastic bags while trying to eat vegetable waste stuffed in the garbage.**

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CATTLE AND PLASTIC BAGS

- Could any body believe that ca 100 cattle / day die in UP due to plastic.
- A dead Cow in Delhi yielded 35 to 70 kg of plastic bags !!!
- Recently, a Cow had ingested 72 kg of plastics and metal pieces, including nails and syringes, needles, etc. in Faridabad Nov 2021.



That shows the enormity of the plastic menace in our country

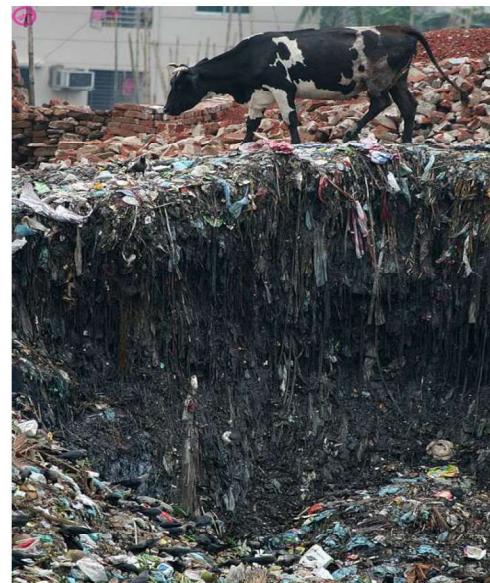
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CATTLE AND PLASTIC BAGS

A cow on a mound of plastic bag waste dump at the back of a posh area of Metropolitan City in our country!!!



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Plastic and clay pots in river Ganga in Varanasi



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Plastic waste and human life



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Plastic waste and human life



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Plastic Pollution in Ganges

- The scientists calculated that the Ganges and two nearby waterways are responsible for pumping as much as three billion microplastic particles into the Indian Ocean.



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What is this ???



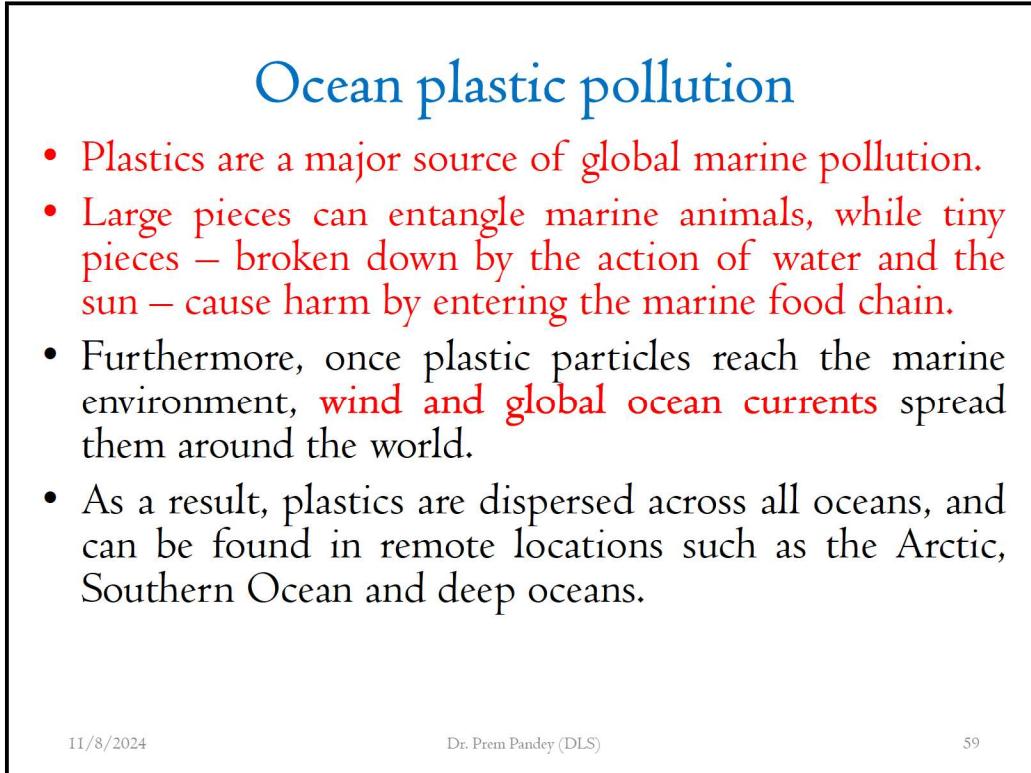
Plastic Pollution in China- river bed of plastic waste





Ocean plastic pollution

- Plastics are a major source of global marine pollution.
- Large pieces can entangle marine animals, while tiny pieces – broken down by the action of water and the sun – cause harm by entering the marine food chain.
- Furthermore, once plastic particles reach the marine environment, **wind and global ocean currents** spread them around the world.
- As a result, plastics are dispersed across all oceans, and can be found in remote locations such as the Arctic, Southern Ocean and deep oceans.



Ocean plastic pollution

- Ocean plastic pollution is an alarming issue due to its persistence, complexity, steady growth and the pervasive impacts it has on all aspects of ecosystems.

A HEAVY TOLL ON MARINE LIFE

- Thousands of animals, from small finches to blue whales, die grisly deaths from eating and getting caught in plastic.

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Dead whale and plastic-demonstration to raise awareness



PHOTO FROM GREENPEACE PHILIPPINES

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Plastic Debris

- Fishing nets, usually made of plastic, can be left or lost in the ocean by fishermen. Known as ghost nets, these entangle fish, dolphins, sea turtles, sharks, dugongs, seabirds, crabs, and other creatures,
- Impact:
 - restricting their movement,
 - causing starvation,
 - Laceration- (damage to soft tissues) & infection, and,
 - in those that need to return to the surface to breathe, suffocation.

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Plastic Debris

- Plastic debris, when bulky or tangled, is difficult to pass, and may become permanently lodged in the digestive tracts of these animals,
 - blocking the passage of food and
 - causing death through starvation or infection.

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Plastic Debris

- Eighty percent of marine debris is plastic - a component that has been rapidly accumulating since the end of World War II. The mass of plastic in the oceans may be as high as one hundred million metric tons.
- Discarded plastic bags, six pack rings and other forms of plastic waste which finish up in the ocean present **dangers to life and fisheries.**
- Aquatic life can be threatened through entanglement, suffocation, and ingestion.

Plastic Debris

Plastics accumulate because they don't biodegrade in the way many other substances do.

They will photo-degrade on exposure to the sun causing their breakdown, but they do so properly only under dry conditions, and

- water inhibits this process.
- In marine environments, photo-degraded plastic disintegrates into ever smaller pieces while remaining polymers, even down to the molecular level.

Plastic Debris

- When floating plastic particles photodegrade down to zooplankton sizes, jellyfish attempt to consume them, and in this way the plastic enters the ocean food chain.
- Many of these long-lasting pieces end up in the stomachs of marine birds and animals, including sea turtles, and black-footed albatross

Ocean plastic pollution

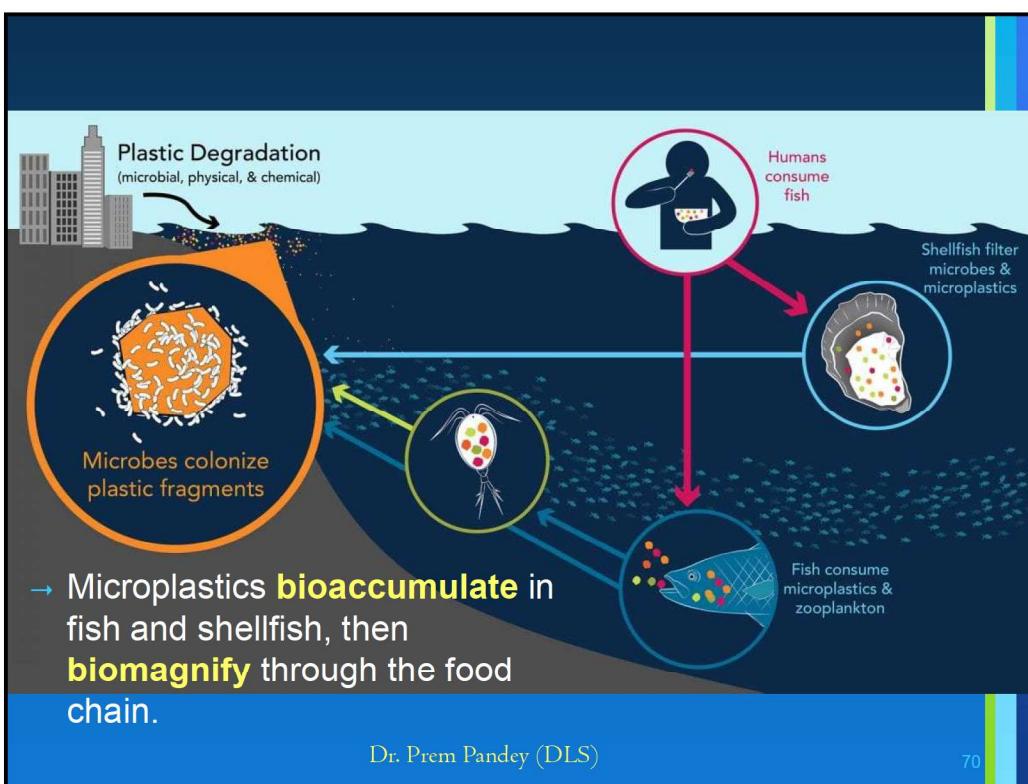


→ Plastics are not biodegradable but will break down into smaller pieces as they are exposed to sunlight, forming tiny **microplastics**.



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- There are five major circular currents called **gyres** that plastic pollution accumulates in.

Gyres: Large system of rotating ocean currents.



Ocean plastic pollution

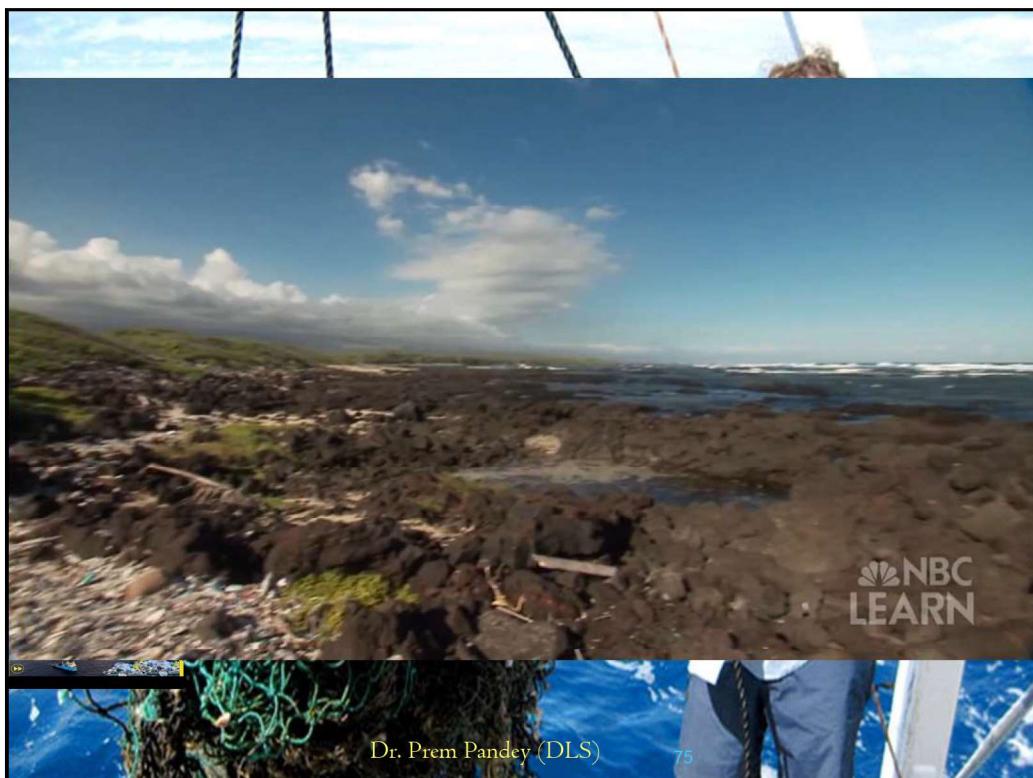


5 PLASTIC GYRES

Gyres: Large system of rotating ocean currents.
87000 tons of floating plastic in these gyres

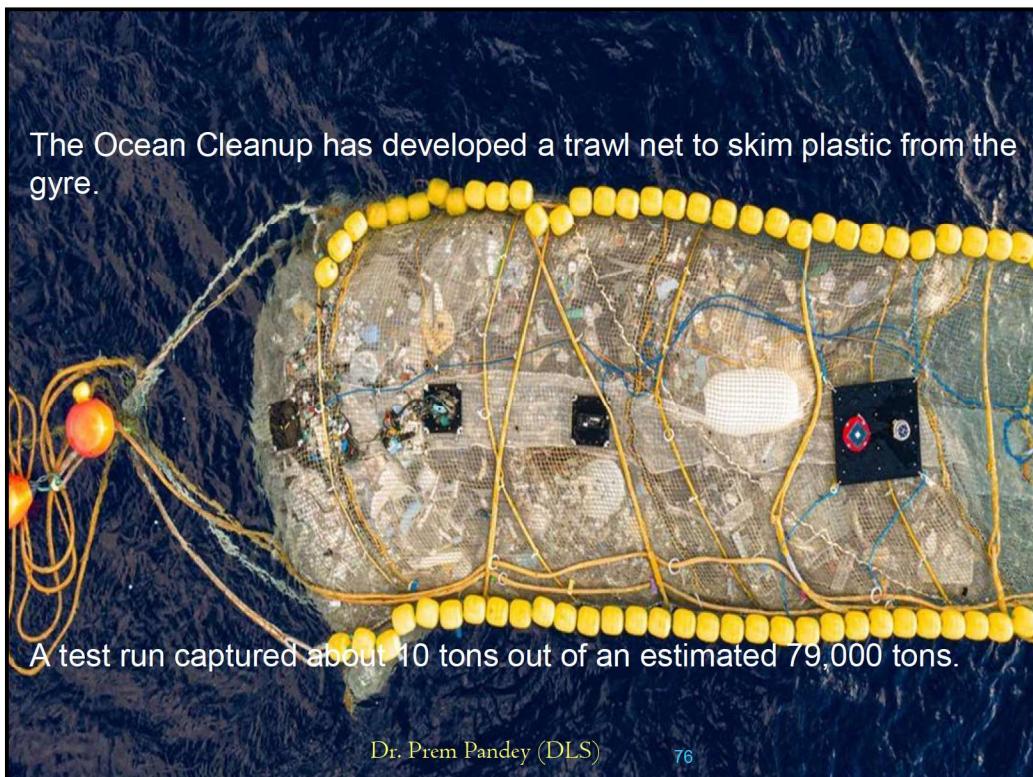
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A Dutch Teenager Had a Dream to Clean Up the World's Oceans. 7 Years On, It's Coming True

- For someone who gets violently seasick, **Boyan Slat** spent a lot of time thinking about the ocean.
- The **Dutch inventor** has designed the world's first ocean plastic cleanup system but admits he won't be on the ship with it when it launches out of San Francisco. "I am not a man of the sea," he says.
-

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System 001

- The idea grabbed imaginations around the world.
- In 2015, an early prototype of *System 001* was featured on TIME's list of the best inventions of 2015.
- The project has come a long way since then, Slat says. "It takes a trained eye to see the similarities."
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Boyan Slat -CEO of The Ocean Cleanup



Boyan Slat -CEO of The Ocean Cleanup

- If all goes to plan, Slat says, an array of 60 systems could reduce the amount of plastic there by half by 2025. “I hope that this will be a turning point for the plastic pollution problem,” Slat tells TIME in a phone interview a few days before the launch, in between final preparations. “For sixty years it has only gotten worse and worse. Now hopefully we’re turning the tide.”

A Dutch Teenager Had a Dream to Clean Up the World's Oceans. 7 Years On, It's Coming True

- After five and a half years of hard work, **the 23-year-old Slat** will watch from dry land as *System 001* — a floating barrier **nearly 2,000ft long** — snakes its way out under the Golden Gate Bridge into the Pacific.
- Its destination is the [Great Pacific Garbage Patch](#), a gyre of plastic waste twice the size of Texas held in position by ocean currents **between California and Hawaii**.

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System 001 floating in the San Francisco Bay before its launch

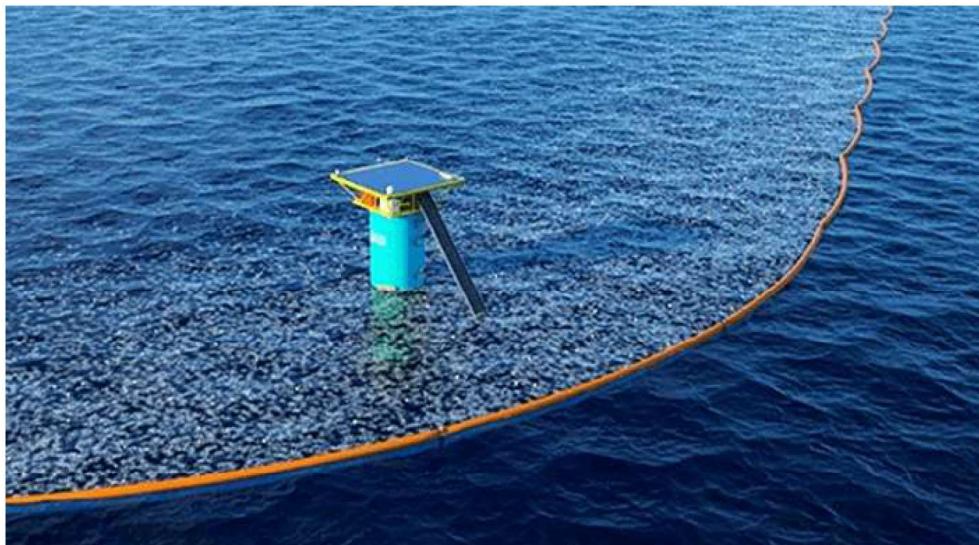


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Ocean Cleanup of plastic



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Ocean Cleanup of plastic



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Ocean Cleanup of plastic



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Ocean Cleanup of plastic



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Harmful Health effects of Plastics

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CHEMICALS IN PLASTIC:-

The vast majority of plastics are composed of polymers of carbon and hydrogen alone or with oxygen, nitrogen, chlorine or sulphur in the backbone. Common plastics types are:

1. **Polypropylene (PP)**- Food containers, appliances, car fenders (bumpers)
2. **Polystyrene (PS)**- Packaging foam, food containers, disposable cups, plates, CD boxes.
3. **High impact polystyrene (HIPS)**- Fridge liners, food packaging, vending cups.
4. **Acrylonitrile butadiene styrene (ABS)**- Electronic equipment cases as computer parts, drainage pipe etc.
5. **Polyethylene terephthalate (PET)**- Carbonated drink bottles, jars, plastic films, microwavable packaging.
6. **Polyester (PES)**- Fibres, textiles.



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Chemicals in Plastic:-

Polyamides (PA) (Nylons)- Fibres, toothbrush bristles, fishing line, under the hood car engine mouldings.

Polyvinyl chloride(PVC)- Plumbing pipes and guttering, shower curtains, window frames.

Polyurethanes (PU)- Cushioning foams, thermal insulation foams, surface coatings, printing rollers.

Polycarbonate (PC)- Compact discs, eyeglasses, security windows, traffic lights, lenses.

Polyvinylidene chloride (PVDC)- Food packaging

Polyethylene(PE)- Wide range of inexpensive uses including super market bags, plastic bottles

Polycarbonate/Acrylonitrile Butadiene Styrene(PC/ABS)- Car interior and exterior parts.

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BISPHENOL A (BPA): A POTENTIAL HEALTH HAZARD

- BPA leaches from plastics and resins when exposed to:
 - hard use or at high temperatures
 - as in microwave ovens and dishwashers or
 - hot milk baby bottles,
 - reusable water bottles,
 - protective linings inside most food/beverage cans.
- BPA is a endocrine disruptor because it mimics estrogen, a natural hormone.



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BISPHENOL A (BPA): A POTENTIAL HEALTH HAZARD

BPA increases

- the incidence of heart diseases,
- diabetes,
- liver disorders,
- Infertility,
- brain and
- hormone development problems in fetuses and young children.
- BPA promotes breast cancer; brings about early puberty in girls, decreases sperm count in rats.
- In 2004 study by the Centre for Disease Control & Prevention (CDCP), USA indicated BPA in urine of 93% of those tested; children are more exposed to BPA – milk bottles, toys, toilet seats, prams, etc all of plastic !!!

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BURNING PLASTIC

When plastic in municipal solid waste/household trash burns it results in emission of deadly poisonous chemical commonly called

DIOXIN

(polychlorinated dibenzo-p-dioxin and polychlorinated dibenzopurans).



Harmful chemical- its toxicity depends upon :

1. Number of chlorine atom and
2. Position of chlorine atom.

More chlorine atom more toxic.

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BURNING PLASTIC

- DIOXIN is a toxic organic chemical that contains chlorine and is produced when chlorine and hydrocarbons are heated at high temperatures.
- To inhale DIOXIN or to be exposed to its fumes can result in deadly diseases such as lung cancer



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Banning Use of PLASTIC BAGS

- Several countries have already banned the use of plastic bags.
- In India, there are a few progressive states such as **Maharashtra, Delhi, Punjab, Rajasthan, Himachal Pradesh, Goa, West Bengal** which have banned use of plastic Bags.
- In **Udagamandalam district of Tamil Nadu, and Simla, HP** use of plastic bags is completely banned and fines are imposed on users.

Banning Use of PLASTIC BAGS

- The MoEF has banned the manufacture and use of plastic bags
 - less than 8 inches x 12 inches in size, and
 - 20 microns in thickness.
- However, the implementation is tardy as evident from the free use / availability of plastic bags of any size or thickness

Plastic Pouches in the Market



Plastic Waste and its Management



Category and Sources of Plastic Waste

1. Thermo-plastics (Remoulding possible)- 80% waste in the country-
PET(Polyethylene Terephthalate),
HDPE,
LDPE,
PVC(Polyvinyl chloride), PS (Polystyrene), PPE (Polyphenylene Ether), etc.
 2. Thermo-set Plastics (Remoulding not possible)-constitute 20% non recyclable
– melamine, silicon, polyurethane, phenol formaldehyde,etc.
- (i) *Municipal sources*- residential markets, commercial establishments, hotels, hospitals
- (ii) *Industry sources*- food chemical, packaging films
- (iii) *Other sources*- Automative, agriculture, industrial, construction

Plastic Waste Management- Recycling

1. **Primary Recycling** – Similar or original product
2. **Secondary Recycling** – Product different from the original
3. **Tertiary Recycling** – Production of basic chemicals and fuels
4. **Quaternary Recycling** —Reduces energy content by burning/incineration

Plastic Bags and Environment

- They break down into tiny toxic particles that contaminate the soil and waterways and enter the food chain when animals accidentally ingest them.
- The problems surrounding waste plastic bags start long before they photodegrade.
- Our planet is becoming increasingly contaminated by our unnecessary use of plastic bags.
- A plastic bag can take between 400 to 1,000 years to break down in the environment.
- As it breaks down, plastic particles contaminate soil and waterways and enter the food web when animals accidentally ingest them. ...

Plastic Bags and Environment

- Plastic bags tend to disrupt the environment in a serious way.
- They get into soil and slowly release toxic chemicals. They eventually break down into the soil, with the unfortunate result being that animals eat them and often choke and die.

Environmental Damage Caused by Plastic Bags

Clogged Sewage Systems

- Even in urban areas, where wildlife is relatively scarce, plastic bags cause significant environmental harm.
- Runoff water collects and carries discarded plastic bags and ultimately washes them into storm sewers.
- Once in these sewers, the bags often form clumps with other types of debris, and ultimately block the flow of water.
- This prevents runoff water from properly draining, which often inconveniences those living or working in the area.

Clogged Sewage Systems

- For example, roads often flood when storm sewers become blocked, which forces them to be closed until the water drains.
- This excess water can damage cars, buildings and other property, and it also collects pollutants and spreads them far and wide, where they cause additional damage.
- Clogged storm sewers can also disrupt the water flow throughout local watersheds. Blocked sewer pipes can starve local wetlands, creeks and streams of the water they require, which can lead to massive die-offs and in some cases, total collapse.

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Plastic Bag Pollution



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Recycling of Plastic

- Recycling of plastics is desirable as it avoids their accumulation in landfills – they constitute only about 8% by weight or 20% by volume of municipal solid waste but
- The low density and slowness to decompose makes them a visible and a dominant pollutant.
- Recycling of scrap plastic by manufacturers has been highly successful and has been proven economical but recovering discarded plastic from consumers is an hindrance and more difficult.

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RECYCLING OF PLASTIC

- Labeling plastic items in separate garbage containers has been employed in many countries and in cities in
- India which enables the consumers to identify them easily for safe disposal and recycle the waste plastic.
- **Manual sorting of garbage for recyclable plastics is time consuming and expensive.**



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RECYCLING OF PLASTIC

PLASTIC RESIN CODES

1	2	3	4	5	6	7
PETE	HDPE	PVC	LDPE	PP	PS	OTHER
Polyethylene Terephthalate	High Density Polyethylene	Polyvinyl Chloride	Low Density Polyethylene	Polypropylene	Polystyrene	Other
Recyclable	Recyclable	Recyclable at specialist points	Recyclable at specialist points	Recyclable	Recyclable at specialist points	Not easily recyclable

* Check with your local recycling program to confirm which materials are accepted in the recycling bin or at a special drop-off or collection program.

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REMOVAL OF PLASTIC WASTE FROM A DRAIN IN KOLKATA FOR RECYCLING

- Automatic sorting , which depends on
 - various physical,
 - optical or
 - electronic properties of plastics,
 has been developed and employed successfully in developed countries.
- But such methods prove to be difficult and expensive because of variety of size, shape and colour of plastic objects



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Recycle

- rubbish → new useful products.
- Paper, plastics, glass, metal and textiles can all be recycled.

Reuse



- Bottles } drinking water
- Bottles } eco bricks
- Bottles } plant holders
- Plastic boxes (e.g. ice cream containers) as lunch boxes
- Be creative & use your imagination

•Others

- Put in the dustbin
- Compost

Pan-India Initiatives on plastic pollution

1. Use of recyclables in government offices in Kerala
2. *Extracting of plastic waste from water bodies in Kerala*
3. Tackling plastic use in Sikkim
4. Utilising plastic for road surfacing
5. Recycling plastic for better purposes
6. Adoption of “co-processing of waste” technique in Gujarat to deal with plastic pollution
7. Introduction of “Beat Plastic Pollution” drive by Sustainable Environment and Ecological Development Society (SEEDS) in East Delhi schools
8. Fishermen of Kerala turning plastics from ocean into roads

Road from Plastic Waste in Kerala

- Plastic Man of India- **Rajgopalan Vasudevan**
Known for Waste management plastic roads.



1. Recycling reduces pollution



Recycling reduces pollution by minimizing the energy spent during the manufacturing process.

Major benefit of minimizing the energy spent is reducing greenhouse gas to the environment.

Greenhouse gases are produced proportion to the amount of energy spent. Therefore if we recycle and cut down the energy spent, we can reduce pollution.

Also plastics contain harmful chemicals itself such as cadmium, lead, PVC and other pollutants in the form of artificial coloring, plasticizers, and stabilizers. Since the toxic plastics are filling up the landfills and floating around in the oceans, the plastics are releasing pollutants into the environment. It makes health risks for both animals and humans.

3.Recycling saves natural resources



Recycling saves natural resources.

We don't have unlimited resources, so it is very important to recycle to save natural resources.

Making new plastic requires significant amounts of fossil fuels. About 8% of the world's fossil fuels are used in producing new plastics. It is about million of tons of fuels per year.

Therefore, recycle could preserve these fuels. For example, if we recycle plastic, we can save about 3.8 barrels of oil by recycling one ton of plastic bottles.

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Alternatives

Plastic waste disposal through Plasma Pyrolysis Technology (PPT)

Conversion of Plastic Waste into Liquid Fuel.

Biodegradable Plastics.

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ECOZURI™ ----- THE ALTERNATIVES FOR PLASTIC BAGS-----

	Paper bags	Biodegradable bags	Reusable bags
Pros	<ul style="list-style-type: none"> Degradable in well-run landfill Hold more stuff Higher percentage of recycling (10% -15% versus 1%-3% for plastics) 	<ul style="list-style-type: none"> Light and convenient like plastic bags Biodegradable in certain conditions 	<ul style="list-style-type: none"> Reduce energy usage, landfill, and pollution due to its reusable nature
Cons	<ul style="list-style-type: none"> Consume forests Take 4 times as much energy as needed to produce Generate 70% more air pollution and 50 times more water pollution in production Take 90% more energy to recycle when recycling rate is low 7 times heavier than plastic to transport Take up more space in landfill 	<ul style="list-style-type: none"> Highly confusing definition of bio-plastics. Many bio-based products are not necessarily biodegradable Many biodegradable bags require special processing and facilities. There are limited collection and processing platforms When mingled with traditional plastics, this causes contamination and make the product unrecyclable 	<ul style="list-style-type: none"> If the bags are not reused a sufficient number of times, more energies are wasted as most reusable bags are made from materials that require more energy to produce Difficult to remember as it requires living habit changes Inconvenient since most products are bulky to carry
	NOT THE RIGHT ANSWER	NOT AS GOOD AN ANSWER AS IT SOUNDS	THE RIGHT ANSWER – BUT NEED INDIVIDUAL EFFORTS

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Source: Literature research

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www.ecozuri.com

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Degradable Plastic

- One success story was the introduction of **carbonyl groups** into polythene by mixing carbon monoxide with ethylene during synthesis.
- These **carbonyl groups** are chromophores that lead to chain breaking upon the absorption of ultraviolet light.
- The polymer is then broken down into small enough units thus degrading the plastic

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Degradable Plastic

- Recently, **degradable plastic bags** have been introduced in India:
 - (i) Bags made from **CORN STARCH** has been introduced in India by Greendiamz Biotech Ltd. Ahmadabad, which is marketed by Sunshield Biotech LLP-Mumbai (www.truegreen.in; E.Info@truegreen.in; +91 9099934 301).
 - (ii) **TRUEGREEN** 100% Compostible by Greendiamz Biotech Ltd. Ahmedabad
 - (iii) **AmpAcet** biodegradable bags

Degradable Plastic

- The **compostable biodegradable plastic bags** gets converted to invaluable compost/manure under normal composting conditions which helps to improve the nutritional quality of the soil.