



SINGLE USE DIST DIST THE LAST STRAW

A watershed moment in the anthropogenic era







About Toxics Link

Toxics Link is an Indian environmental research and advocacy organization set up in 1996, engaged in disseminating information to help strengthen the campaign against toxics pollution, provide cleaner alternatives and bring together groups and people affected by this problem. Toxics Link's Mission Statement - "Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and the dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world." Toxics Link has a unique expertise in areas of hazardous, medical and municipal wastes, international waste trade, and the emerging issues of pesticides, Persistent Organic Pollutants (POPs), hazardous heavy metal contamination etc. from the environment and public health point of view. We have successfully implemented various best practices and have brought in policy changes in the aforementioned areas apart from creating awareness among several stakeholder groups

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ABBREVIATIONS

СРСВ	Central Pollution Control Board
DCP	Disposable cups and plates
HIPS	High Impact Polystyrene
Кд	Kilogram
PE	Polystyrene
PET	polyethylene terephthalate
РСРР	Personal Care Packaging Products
PUC	Pollution Under Control
SPCB	State Pollution Control Board
SUP	Single Use Plastic
UNEP	United Nations Environment Programm







Source: The New Plastics Economy Rethinking the future of plastics, World Economic Forum, 2016

KALKEKI

The etymology of the word plastic comes from Greek word 'plastikos', which means something which can be moulded. 'Plastikos' symbolizes the malleable nature of plastic which can be manufactured in various forms. Plastic has proven itself through decades when tested against the waters of durability and malleability and because of these properties, it is found everywhere, even in our oceans! Our dependence on plastic has increased manifolds and in today's era it is difficult to go without using plastic in some form even for a day. According to Global Citizen, plastic production has more than tripled since the '90s.

Much of the plastic we produce is designed to be thrown away after being used only once. The wide usage, as well as proliferation of this one time use or single-use plastic has led to huge piles of plastic waste globally. And only 9 percent of the nine billion tonnes of plastic that has been ever produced globally (single use as well as the rest) got recycled¹. The rest, it means, either got landfilled or dumped without any sound measures. Left in the landfill or dumpsites, the non-biodegradable plastic persists and chokes our environment. Very large quantities of



FIGURE 1 Growth in Plastic Production (Data Obtained from https://ourworldindata.org/plastic-pollution)

FIGURE 2 Plastic waste generation sector wise



plastic waste leak into the environment from sources both on land and at sea, generating significant economic and environmental damage. If current consumption patterns and waste management practices do not improve, by 2050, there will be about 12 billion tons of plastic litter in landfills and the natural environment². In 2016, 12 percent of all municipal solid waste globally was plastic³.

Since Plastic as a material has also has also got huge advantages, it is virtually impossible to eliminate it from our lives, but considering its environmental impact, definitely it is certainly high time to try and evaluate its usage. Single use plastics, which are a huge contributor to the plastic waste problem, is attracting considerable local, national and international interest and there has been in recent times increase in debates on whether we need action on items such as plastic bags, packaging material, tea/coffee cups and polystyrene.

1.1. Plastic Recycling

'Plastic is recyclable' is often the argument made by plastic industry, when faced with the questions of massive plastic waste generation and its toxicity. However, in reality plastic can be mostly down-cycled and it can be done for a limited number of times, after which the material joins the waste stream. Besides, plastic recycling is not always a safe process as melting of plastic while recycling, in less than optimal conditions, can lead to the release of the toxins including Dioxins and Furans and many other Volatile Organic Compound (VOC)⁸. Down-cycling simply delays the process of plastic and its chemicals leaching into the environment.

Also, not all types of plastic are recycled. The table below shows the plastic recyclability, resin wise. Multilayer packaging, which has plastic as a primary layer, is also difficult to recycle and process.

Table 1: Resin and recyclability

Type of Plastic	Symbol	Uses	Recyclable
Polyethylene Terephthalate		Plastic Bottles (Water, Cooking Oil, Soft Drink)	Yes
High-Density Polyethylene	HDPE	Milk Containers, Cleaning Agents, Personal Care Products Packaging	Yes
Polyvinyl Chloride	23 PVC	Plastic Piping, Vinyl Flooring, Cabling Insulation, Roof Sheeting	Yes
Low-Density Polyethylene		Plastic Bags, Food Wrapping	Occasionally
Polypropylene		Bottle Lids, Food Tubs, Medical and Automobile parts	Occasionally
Polystyrene	C ⁶ PS	Food Takeaway Containers, Plastic Cutlery, Egg Tray	Occasionally
Code 7- Polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon	0THERS	Water Cooler, Bottles, Baby Cups, Fibre Cups	Difficult

1.2. Concerns of Plastic

Plastic is one of the major pollutants of present time. At every stage of its lifecycle, plastic poses distinct risks to human health, arising from both exposures to plastic particles themselves and associated chemicals. Plastic persists and causes serious damage to environment during its complete life cycle, beginning from production to its usage, to its disposal process. Being composed of toxic chemicals and most importantly a non-biodegradable substance, plastic pollutes environment, especially air and water. The harmful effects of plastic on aquatic life are devastating, and accelerating.

Starting with the manufacturing process, conventional plastic production is highly dependent on virgin fossil feedstock (mainly natural gas and oil) as well as other resources, including water – it takes about 8 litres of water to make one litre plastic bottle⁴. Plastics production consumes up to 6% of global oil production and is projected to increase to 20% by 2050, according to the current consumption pattern. Plastics are therefore a major contributor to greenhouse gas emissions: CO₂ emissions from the extraction and processing of fossil fuel as plastics feedstock; and the combustion of waste plastics, emitting 390 million tonnes of CO₂ in 2012⁵. On current trends, emissions from the global plastics sector are projected to increase from 1% in 2014 to 15% of the global annual carbon budget by 2050⁶.

The impact of plastic continues in its usage phase as well as some plastics contains toxic chemical additives, which are used as plasticisers, softeners or flame retardants. These chemicals include some persistent organic pollutants (POPs) such as short-chain chlorinated paraffins (SCCP), polychlorinated biphenyls (PCBs), polybromodiphenyl (PBDE) including tetrabromodiphenyl ether (tetraBDE), pentabromodiphenyl ether (pentaDBE), octabromodiphenyl ether (octaBDE) and decabromodiphenyl ether (decaBDE), as well as endocrine disruptors such as bisphenol A (BPA) and phthalate. Chlorinated dioxins (polychlorinated dibenzo-p-dioxins), chlorinated furans (polychlorinated dibenzofurans), PCBs (polychlorinated biphenyls), and hexachlorobenzene (HCB) are also byproducts of the manufacture of polyvinyl chloride (PVC). These chemicals have been linked to health issues such as cancer, mental, reproductive, and developmental diseases.

TOXIC CHEMICAL ADDITIVES TO PLASTIC		
TOXINS	USES	HEALTH IMPACT
Acrylonitrile	Drinking cups, acrylic carpet	Carcinogen
Bisphenol A	Polycarbonate plastics, plastic tableware, dental fillings	EDC
Cadmium	Colorant and Stabilizer	Carcinogen, Neurotoxin
Flame retardants	Home furnishing and Electronics	EDC, Immune Disruptor, Hormone Disruptor
Lead	Stabilizers	Growth Inhibitor, Reduced Kidney Functionality
Perfluorinated Substances (PFAS)	Grease and Stain Repellant	Carcinogen, Thyroid Disruptor
Phthalates	Plasticizer	EDC, Neurotoxin
Styrene (Vinyl Benzene)	Polystyrene plastics and expanded polystyrene.	Carcinogen
Vinyl Chloride	PVC: plastic furniture	Liver Cancer
SCCP	Plastic consumer product, children's products	Carcinogen, Disrupts Liver and Kidney Functionality

Table 2: Additives in Plastic and its health impact

Plastic waste causes a plethora of problems when it leaks into the environment as this non – biodegradable material litters, reaches marine ecosystems, the chemicals in it as additives or stabilizers, leaches to contaminate soil and water. No one knows how much unrecycled plastic waste ends up in the ocean, Earth's last sink. In 2015, Jenna Jambeck, a University of Georgia engineering professor, caught everyone's attention with a rough estimate: between 5.3 million and 14 million tons each year just from coastal regions. Most of it isn't thrown off ships, she and her colleagues say, but is dumped carelessly on land or in rivers, mostly in Asia. It's then blown or washed into the sea. Plastic has been detected on shorelines of all the continents, with more plastic materials found near popular tourist destinations and densely populated areas. The main sources of marine plastic are land-based, from urban and storm runoff, sewer overflows, beach visitors, inadequate waste disposal and management, industrial activities, construction and illegal dumping. Ocean-based plastic originates mainly from the fishing industry, nautical activities and aquaculture.



Plastic in the Ocean- https://oceanservice.noaa.gov/hazards/marinedebris/plastics-in-the-ocean.html

A substantial amount of plastic waste is added in the marine ecosystem through rivers; Asia being the largest contributor of plastic waste entering marine ecosystem in 2015. If the current trend continues then there will be equal plastic by weight in marine ecosystems as fishes by 2050⁷.

In Asia, China and India come out to the forefront with Ganges (India) and Yangtze (China) being the largest contributors of Plastic Mass input from Rivers across the world.







FIGURE 4: Plastic in Rivers (million tonnes) (Data obtained from https://ourworldindata.org/plastic-pollution)

FIGURE 5: Routes of exposure to plastic (Adapted from Plastics and Health: The hidden costs of a plastic planet)



Under the influence of solar UV radiation, wind, currents and other natural factors, plastic fragments into small particles, termed microplastics (particles smaller than 5 mm) or nano plastics (particles smaller than 100 nm). These smaller fragments of plastic attract and absorb more toxic chemicals from the water bodies and are subsequently indigested by marine animals. This way these toxic fragments even enter our food chain as well.

Another big concern arising from plastic littering is its ingestion by animals. Plastic bags are often ingested by animals that mistake them for food or take it along with food. High concentrations of plastic materials, particularly plastic bags, have been found blocking the airways and stomachs of hundreds of species, especially cows. Plastic bags can also block waterways and exacerbate natural disasters. By clogging sewers and providing breeding grounds for mosquitoes and pests, plastic bags can increase the transmission of vector-borne diseases like malaria.

1.3. Plastic Waste in India

Plastic is one of the fastest-growing industries in India and is connected to almost all kinds of businesses. According to All India Plastic Manufacturers Association, India's plastic industry recorded an annual revenue worth Rupees 3.5-lakh crore in 2019. This was spread across 50,000 processing units, the bulk of these being small and medium enterprises. These units, consume around 22 million metric tonnes per annum of plastic raw material, including recycled plastics (roughly about 8 million metric tonnes recycled plastic). The growth rate of the Indian plastics industry is one of the highest in the world and with a growing middle class and a low per capita consumption of plastics, this trend is likely to continue. In 2017-2022, the predicted polymer consumption growth is 12.9%⁸.

Plastic waste is a major environmental and public health problem in India, particularly in the urban areas.

According to the CPCB report for the year 2018-2019, Central Pollution Control Board has estimated that India generates approximately 3.6 Million Tonnes per annum of plastic waste⁹. This amounts to 0.03 tonnes per capita and 9206 tonnes everyday generation of plastic waste.

On ground, discarded plastic waste litter the country's roads, rivers and also form huge mounds in garbage dumps across the country. Though there are regulatory frameworks in the country- the center and various state governments have enacted multiple laws, but with little success and the measures have been unable to curb the menace. Plastic waste from households is almost never segregated at source, and finds its way to municipal waste – dumped in landfills, burnt or picked up by ragpickers. Plastic waste recycling is mainly done in the informal sector in India. The sector provides livelihood to millions of people and keeps the waste out of landfills. But, the plastic recycling technologies used in India are often old and rudimentary, resulting in the down cycling of plastics into lower-quality

products. Recycling units, which are hardly ever monitored, are often located in slums, residential areas and end up polluting the air and water through their releases.

Apart from recycling, there have been initiatives to use the plastic waste in manufacturing units through co processing, wherein industries like cement, steel production and power stations substitute primary fuel with plastic waste. There have been also efforts to use plastic in Roads, though a long-term impact of this is still unknown.



FIGURE 6: State wise Plastic generation in India



2. SINGLE-USE PLASTIC

Since the 1950s, growth in the production of plastic has largely outpaced that of any other material, with a global shift from the production of durable plastics to single-use plastics. Single Use Plastic (SUP), often referred to as disposable plastic, is manufactured with the aim of using only once before disposing or recycling. These items are particularly litter prone and include plastic used for packaging, bottled water, carry bags, straws, blood bags and numerous others. Single Use Plastic represents the philosophy of plastic industry, 'take, make, use and dispose' and has replaced many traditional used materials, especially for packaging. This is primarily to reduce weight, provide flexibility and overall increase convenience.

Another major reason for proliferation of SUPs is the changing lifestyle, especially in urban context. Increased mobility means needs to carry food, liquid and other personal care products- smaller pouches or containers, made of plastic, is seen as more convenient and hence are now widely in use. Online shopping or



FIGURE 7:



ordering food uses additional packaging- again made of plastic. All of these are primarily single use plastic, ready to be disposed off and add to the already burgeoning waste stream. But unlike the traditional materials like paper, glass, metal, which would rust, corrode or get recycled, SUPs either get down-cycled, or break down over time to microplastics- contaminating our water and soil or are just reaching our landfills.

It's estimated that 500 billion disposable coffee cups are produced globally each year

The linear nature of such plastic is costing our environment much more than our imaginations. Single Use plastic, with its short usage life, forms a significant amount of plastic waste being generated. Single-use plastics, and in particular plastic packaging is widely available, persistent, and at prone to disposal to landfill or to littering, where it may enter the marine environment. Due to its persistency, these impacts are growing as each year we generate more plastic waste. In 2015, plastic packaging waste (single use plastic designed for immediate disposal) accounted for 47% of the plastic waste generated globally, with half of that appearing to come from Asia¹⁰.

According to a recent report¹¹, the most common material found during international coastal clean ups are, in order of magnitude, cigarette butts, plastic beverage bottles, plastic bottle caps, food wrappers, plastic grocery bags, plastic lids, straws and stirrers, glass beverage bottles, other kinds of plastic bags, and foam take-away containers. Not surprisingly, the top ten materials found had many single use plastics. If a survey of similar nature was done for inland, the results might not be very different. Single-use plastics make up on average 49% of beach litter in Europe, with cigarette butts being the most littered item in all four European Regional Seas Areas¹². A study found 16 billion coffee cups, 580 billion cigarette butts, 2.5 billion takeaway packaging and 36.4 billion drinking straws in marine litter in Europe; all these being single use plastic. Estimates suggest 50% of plastic is discarded in India after single use¹³.

2.1. Main polymers being used in Single-Use plastic

Single use plastics encompasses many different kinds of products – from packaging to cutlery, from stationary products to carry bags and hence different types of plastic resins are used to manufacture these disposables. Some of the main polymers used are-

- **1. LDPE**-Low Density Polyethylene finds its application in the manufacturing of bags, trays, containers and food packaging film. LDPE type.
- 2. PS Polystyrene finds its application in the manufacturing of cutlery, cups and plates
- **3. HDPE** High Density Polyethylene finds its application in the manufacturing of milk bottles, freezer bags, shampoo bottles and ice cream containers.
- **4. EPS** Expanded Polystyrene finds its application in the manufacturing of hot drink cups, insulated food packaging and protective packaging for fragile items.
- 5. **PET** Polyethylene Terephthalate finds its application in manufacturing bottled drinking water and other beverages, dispensing containers for cleaning fluids, biscuit trays
- 6. **PP** –Polypropylene finds its application in manufacturing of microwave dishes, ice cream tubs, potato chips bag and bottle caps.

TABLE 3: SUPs replacing traditional materials

Product	Traditional Material	Current SUP in use
Milk	Glass, metal	Plastic pouches
Toothpaste, Shaving cream etc	Metal	Multi layered, plastic
Edible Oil	Metal	Plastic cans
Personal care products (Shampoo, cream, lotions etc)	Glass	Plastic bottles, tubes (in some cases multi-layered), pouches
Medicines	Glass	Plastic bottles
Cement, fertilizers	Jute	Plastic woven sacks
Carry bags	Cloth, Jute	Plastic
Biscuits	Paper	Multi-layered, mainly plastic

FIGURE 8: Single Use plastic - new sectors



2.2. Why is Plastic, especially Single Use Plastic, a major threat

The impacts of Plastic start from their manufacturing phase and are persistent through use and disposal stage. Very large quantities of plastic waste leak into the environment from sources both on land and at sea, generating significant economic and environmental damage. But in Single Use Plastic, some of those impacts become more pronounced or heightened. Plastics remain in our environment and continue to release toxins even after their temporary utility is long gone.

2.2.1. ENVIRONMENTAL

In single use plastic, plastic bags are one of the most predominant polluters. Their extensive use, light weight and balloon-shaped design all contribute to their presence in the environment. The biggest problem with these bags, often of low-quality (below 50 µ) plastic, is that once they have been soiled, they do not get collected and hence are not recycled- as the cost of collection makes it often makes recycling economically unviable. Plastic bags are easily blown

in the air which can land in the ocean or land. They are known to clog water ways and drainage systems. They do not just limit themselves to clogging but expand their magnitude causing disasters as well. In 1988, poor drainage, which was a result of plastic bag clogging drains, contributed to devastating floods in Bangladesh¹⁴. Two-third of the country was submerged and the effects were disastrous.

The marine has become sinks for large quantities of single use plastic. The most abundant and widespread source of marine debris is plastics, accounting for 60–95% of marine litter (Walker et al., 2006). Although plastic marine pollution was reported decades ago, it has only recently been recognized as a pervasive global issue. A study has also shown direct relationship between proliferation of marine plastic and lowering of ecological services being offered by the marine ecosystem from a local to a global scale¹⁵. Plastic marine pollution comprises both macro- (> 5 mm) and microplastics(0.1 μ m to<5 mm). And Single Use Plastic is considered as one of key contributors.

Single-Use Plastics bags are one of the largest secondary sources of Microplastics in the ocean as they break up very easily under the action of sun and sea water¹⁶. Microplastics adsorb more chemicals

PICTURE I: Plastic found in stomach of a bird (Source: Google)



with passing time, alongside the toxic additives which were already present in the FIGURE 9: Marine Litter: Adapted from Geyer, Jambeck, and Law, 2017



microplastic. Microplastics do not just harm marine animals, which ingest them; but enter our food chain through them. Microplastics has even been found in table salt (Yang et al, 2015) and in both bottled and tap water (Kosuth et al, 2017). Microplastics have reached unimagined places According to a study by IIT Bombay samples from all eight brands of investigated sea salts, they found microplastic contamination, and concentrations of these particles ranged from 103 ± 39 to 56 ± 49 particles kg⁻¹ of salt¹⁷. A global study by Greenpeace in 21 countries found microplastic in table salt in 36 samples out of 39 tested – India being one of them¹⁸.

2.2.2. ECONOMIC

Imagine going to Goa beach to enjoy sun and sand or to scenic mountains in Himachal Pradesh to find some peace in the wilderness- and finding leftover packets of Noodles or discarded plastic bottles strewn around!! Plastic, especially Single Use Plastic, has been a big 'Visual Polluter', where its littering does not just impact our health and environment but also makes an impact on our aesthetics, and thus impacts the tourism business.

Plastic, since it is non-biodegradable when dumped or littered stays in the environment for a very long time, therefore coagulates and persists. Since single use plastic is generally light weight it and there are higher chances of it being littered therefore it run offs and reaches places where it becomes visually non – appealing. There are countries/states which rely heavily on tourism with much proportion of their GDP dependent upon the same.

The economic damage caused by plastic waste is vast. Plastic litter in the Asia-Pacific region alone costs its tourism, fishing and shipping industries \$1.3 billion per year¹⁹. In Europe, cleaning plastic waste from coasts and beaches costs about €630 million per year. Studies suggest that the total economic damage to the world's marine ecosystem caused by plastic amounts to at least \$13 billion every year²⁰.





Not only tourism, due to rising marine pollution the fisheries and shipping industry gets negatively affected. Marine plastic has the potential to reduce the productivity of commercial fisheries and aquaculture because of entanglement and indigestion in marine animals therefore posing a direct risk to fish stocks. Asia-Pacific Economic Cooperation (APEC) estimated a \$1.3 billion economic impact of marine plastics to the tourism, fishing and shipping industries in that region²¹. Commercial shipping vessels are also extremely sensitive to collisions with plastic pollution, as damage to the vessel could endanger human lives. The Asia-Pacific Economic Cooperation (APEC) estimated the cost of litter damage to commercial shipping at US\$297 million per year.

2.2.3. HEALTH AND SOCIAL

Single use plastics, like all plastics, contain many chemicals as additives- many of them toxic. But because of the kind of usage, single use plastic may have certain additional or more harmful chemicals. For example, Styrofoam or expanded polystyrene (EPS) items, one of most abundantly used single use plastics, contain chemicals such as styrene and benzene. Both are considered carcinogenic and have adverse effects on the nervous, respiratory and reproductive systems, and possibly on the kidneys and liver²². Several studies have also pointed out that the toxins in Styrofoam containers can transfer to food and drinks, and this risk seems to be accentuated when people reheat the food along with the container. With online food delivery using Styrofoam commonly, the dangers are real and risks are high. In India, some of these plastics waste is often illegally burnt for heating in winters or igniting fire for cooking, thus releasing toxic dioxins and furans and exposing mainly the marginalised communities resorting to these burning.

Plastic carry bags are commonly known to clog sewage systems and become breeding ground for mosquitoes and other pests- thus increasing incidences of malaria and other vector borne diseases. Many of the Single Use plastics are littered and left in the open to break down- eventually into microplastics. Studies have now shown presence of microplastics in drinking water, salt and even in human faeces. Though exact health impacts of microplastics in humans is still unknown, it is still a foreign object and likely to cause some disruptions. More research is awaited in this field to understand the real impacts.

The major social impact of plastic littering (mainly single use plastic) is on recreation. Recreational users of coastlines come across plastic waste often and thus are likely to spend less time in these environments or avoid littered sites. Apart from economic, this has impacts on individuals' physical and mental health. Visitors and maritime workers are also susceptible to injuries from plastic debris.

2.3. Users of Single Use Plastic – Key Industries

Though SUPs are used widely, some industries segments have wider or extensive usage. Some key ones are listed below

2.3.1. HOSPITALITY INDUSTRY

This industry has three primary areas and all three use single use plastics in large quantum.

Food Beverages Industry

This area comprises restaurants, fast food chains and other establishments that provide food and beverages. Food and beverage providers might be located in hotels or be standalone facilities. Take away of orders or packing of leftover food from these establishments is solely done in single use plastics. In many fast food restaurants Styrofoam cups, plates and plastic cutlery are used. Usage of plastic straws is rampant in this industry. Online Delivery of food, which these days are not only restricted to metropolitan city but have penetrated to smaller cities and towns, are a major user of single use plastics. An industry estimate, all food delivery aggregators put together processed roughly about 35-40 million orders a month, generating nearly 22,000 metric tonnes of plastic waste in India.²³ Another addition is private or public functions.

Accommodation

This includes hotels, motels, bed and breakfast and other lodging facilities. Most luxury lodging facilities provide small packaging of toiletries which includes shampoo, conditioner, soap, comb, shower cap and many such daily needs itemsalmost all of it fall in single use plastic category. Most accommodations also provide packaged drinking water, which are disposed off after usage, generating lot of single use plastic bottles.

Travel and Tourism

This includes airlines, trains and cruise ships. The food provided by the catering services in many of these services is in single use plastic. With plastic cutlery, plastic cups and food trays foraging in these services this is another sector contributing significantly to single use plastic.

2.3.2. FAST MOVING CONSUMER GOODS (FMCG)

Single-use plastics are majorly used for packaging in FMCG packets and sachets of packed foods, groceries, cosmetics and toiletries. This industry contributes a large quantum of SUPs in the waste stream. Plastic Bags, often referred to as the biggest evil amongst all the single use plastics is used in all grocery and departmental stores. In fact, packaged products (in plastic) are put again in plastic carry bags.

2.3.3. E-COMMERCE RETAIL

In the current lifestyles in urban India, online shopping has become the most popular way to buy all kinds of goods. Since products are shipped from all over the country and can be from outside the country as well, packaging, to prevent product damage, assumes importance. However this packaging is often excessive or unnecessary. One of the consumer narratives, shared in social media platforms, recalls books coming packed in a cardboard box and a bubble wrap-the amount and type of packaging seemed unnecessary in this case. In the picture above, what you see is a package delivered by a leading e-retail cosmetic brand. Packed in four layers of single use plastic, two cardboard boxes, one paper bag and one jute bag arrived a tiny packet which had three pair of earrings (bottom left corner). In a nutshell, online shopping, which is set to grow exponentially, is a key contributor to SUP waste. Grocery and Departmental Stores

PICTURE 2: Excessive packaging



2.3.4. NICOTINE INDUSTRY

Survey done in European Seas Area found cigarettes butts (which have a plastic filter) to be the most abundant in the beach litter. Alongside the plastic packaging that cigarettes come with, cigarettes butts are littered. Cigarette filter is made of cellulose acetate, a kind of non-biodegradable plastic and it takes almost 10 years for this ingredient to completely decompose. According to Swatch India report more than 100 billion cigarette butts get dumped in the landfills of India.

2.3.5. ALCOHOLIC BEVERAGES INDUSTRY

Prevalent material for packaging in alcohol industry always has been glass. However, many alcohol companies are also now manufacturing testers (60 ml) which are being packaged and sold in plastic bottles. Some companies are even selling wines in plastic bottles, port wine being an evident example. Cost reduction and marketing (testers) comes to forefront while analysing any reason for the shift in the packaging material.

2.4. Alternatives: Strength, Weakness, **Opportunities and Threats**

With more research on the impact of use of plastic is becoming clear both consumers and manufacturers are left scrambling for an alternative to this omnipresent material. Many alternatives come to the forefront with their own advantages and disadvantages. The list presented below comes with an analysis in the form of strengths, weakness, opportunities and threats (SWOT). The colour coding followed hence for this section would be in the same format as given below.



2.4.1. GLASS

Glass can be an alternative to single use plastic for packaging food, medicines, personal care products etc. It can be also an alternative to plastic disposable cups and plates. An inert material it does not have any added toxic chemical additives therefore it much safer than its contemporary plastic. However it is difficult to transport the glass as it is heavy and its fragility adds to the problem. Glass packaging cannot replace plastic in online food delivery. However it can replace plastic for personal use and storage where there are less or no transportation problems.



Metal can be a good alternative for plastic packaging of FMCG liquid products such as shampoo, body wash, toothpaste, where the companies could be given the responsibility of collecting the bottles back for reuse and recycle (EPR). However, metal is an expensive alternative and hence the cost is a factor that has to be taken into consideration before making any such changes. Also, for certain usage rusting or metal corrosion can be an issue.

2.4.3. JUTE

Jute can be used in multiple ways instead of plastic. In single use plastic, it aims at replacing plastic bags, which have been recognized as the one of the greater evils in





2.4.2. METAL

There are many types of metal which can be used for packaging instead of plastic. Aluminium, tin-plated steel and tin free steel are the most commonly used metals. As compared to glass, they are more cost effective and have a low transportation carbon footprint. However, this is not the case as compared to plastics where plastic is a clear winner in cost and transportation carbon footprint. But plastics have a high manufacturing carbon footprint. Metal used for packaging is relatively inert as compared to plastic. In the downstream part, Metal is recycled with a very good resource recovery potential unlike plastic which is down cycled. In plastic, certain quality of it does not get picked up for recycling, but metals usually have more potential for collection and thus recycling.



single use plastic contributing to pollution. Jute, a crop with short cycle of growth and production, even has a high carbon dioxide (CO2) assimilation rate. One hectare of jute plants can consume about 15 tons of CO_2 from atmosphere and release about 11 tons of oxygen in the 100 days of the jute-growing season. Studies also show that the CO_2 assimilation rate of jute is several times higher than trees. (Inagaki, 2000). It can even grow on waste lands.

2.4.4. CLOTH

Cloth, made of cotton or canvas, a natural fibre can be used as an alternative to plastic bags. They are strong and durable and therefore can be reused several times. Cotton is the most cultivated non-food cash crop therefore it is widely produced and available. However, - the current crop production is highly water intensive and uses fertilizers and pesticides, it is important that cotton bags are reused. One of the biggest advantages of cloth and jute bag is that they can be reused several times, which weighs heavy in its favour as compared to the manufacturing footprint.

2.4.5. **PAPER**

Paper Bags, the most commonly used alternative of plastic bags, is considered environment friendly as paper is bio degradable. Given as carry bags in stores, they are many a time made of recycled paper. Their low cost is an added advantage as compared to its cloth and jute counterpart. However, their manufacturing process is not so green. Its low durability and strength make it not a perfect material for carrying heavier products.

2.4.6. OTHER ALTERNATIVES

Apart from the traditional used alternatives listed above, newer materials are now being developed or used, though not yet in large scale



Bagasse

Bagasse is a by-product of sugarcane processing. Due to its malleability and stickiness, it can be easily moulded into packaging suitable for food delivery and food service – similar to polystyrene. Unlike polystyrene, it's certified biodegradable and compostable, and being a by-product, much more sustainable to produce.

Bamboo

This fast-growing renewable resource can replace plastic in items like tableware and drinking straws. It is lightweight, durable, and compostable.

Seaweed water bubbles

An edible water bubble made of seaweed has been developed 'to provide the convenience of plastic bottles while limiting the environmental impact'. The company which has developed it claims that its production is more efficient and cheaper than producing plastic bottles. The process produces 5X less CO₂ and uses 9X less Energy vs PET production.

Leaf

In India, serving food on leaf dining plates is a long-standing tradition with its own cultural, religious, medicinal, and socioeconomic significance. The leaf plate stitching was a livelihood activity for tribal people in Odisha, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, and Telangana states of India. The leaves and leaf plates were used extensively used for serving food during marriages, religious festivals, community feasts, etc. The leaves from a vast variety of plants were used as dining plates, food wraps during steam cooking, grilling and frying of various dishes, and food packing material in India. This is certainly on a revive mode and being developed and used globally as well. There is also research to develop palm leaf packaging for food such as fresh fruit, vegetables and nuts.

Fallen Palm leaves from the areca palm are also collected and moulded into the desired shape to be used as container for soap etc. Brilliantly environmentally friendly as they use a natural waste product of the areca palm and the final packaging product is biodegradable. **PICTURE 3:** Sal leaves plate- used traditionally in public and private functions



Bioplastics

Bioplastics refer to a large family of plastics which are sourced from biomass at the beginning of their life (bio-based), metabolized into organic biomass at the end of their life (biodegradable), or both. Based on this, bioplastics can be broken down into three distinct classifications:

Non-biodegradable and fully or partially bio-based for example bio-based PET, bio-based PE, Terratek SC or Terratek WC.²⁴

Biodegradable and petroleum-based - Polycaprolactone (PCL) which is a synthetic aliphatic polyester that isn't made from renewable resources but does completely degrade after six weeks of composting. It's easily processed but hasn't been used in significant quantities because of manufacturing costs. However, blending PCL with corn starch reduces cost.²⁵

Both biodegradable and fully or partially bio-based such as Polylactic Acid (PLA) or starch blends such as Terratek BD. PLA looks and performs similarly to the polyethylene used in plastic films, packing materials and bottles, and it can also be used as a substitute for the polystyrene used in foam food plates and containers and plastic cutlery. But unlike conventional petroleum-based plastics, PLA has some big advantages. For one, since it's made from plants that absorb carbon dioxide as they grow, there's no net increase in carbon dioxide from its raw materials. There are less greenhouse emissions from PLA as compared to conventional plastic.²⁶

Though the industry has been lobbying for its benefits no clarity is given to the consumers many a times that it does not degrade in normal temperatures or conditions, like in compost or landfills. There is a lack of facilities and knowledge around the same therefore they are as harmful to the environment as conventional plastics.

Microplastics is another big issue, there needs to be more research done if these bio-plastics since most of them have plastic resins in them are not releasing microplastics into the environment which will be definitely a menace beyond our control.

Oxo-Biodegradable Plastics

The chemical degradation process of plastics involves the reaction of very large polymer molecules of it, which contain only carbon and hydrogen, with oxygen in the air. This reaction occurs even without pro-degradant additives but at a very slow rate. That is why conventional plastics, when discarded, persist for a long time in the environment. They have formulized the plastic to catalyze or accelerate this reaction and increase the rate of the degradation by several orders of magnitude – i.e. 100's to 1000's of times faster, products degrade and physically disintegrate within a few weeks to 1-2 years, depending on the formulation and the disposal environment. These lower molecular weight fragments are known to, and have been shown, in laboratory simulated composts, to biodegrade into carbon dioxide, water and biomass (cell structure of micro-organisms), which are materials found in nature and part of the bio-cycle. The overall process, from polymer to water, carbon dioxide and biomass is called oxo-biodegradation.²⁷

There is lack of research on the same and no material should be introduced into the environment without assessing its impacts on our ecosystem. We are already suffering from plastic and we do not need another bigger problem in the quest of solving the previous problem.

3. OBJECTIVE AND APPROACH

Plastic pollution has become one of the most pressing environmental crises, as there is massive increase in the use of disposable plastic products or single use plastics. The problem is becoming gigantic, with no clear solutions in sight and in the current state, inability to deal with them. Plastic pollution is most pronounced in developing countries like India, where waste management systems are often inefficient. With the whole globe reeling from the impact, it is time to look closely at plastic pollution, especially from single use plastic and try and find directions towards sustainable use of this valuable material. But for that, it is important that we understand the current practices, challenges and systems.

Though plastic is an often-discussed issue in India and lately there have been deliberations also on single use plastic, there is no comprehensive study to assess the concern.

The overall objective of the project is to reduce plastic in waste streams. More specifically, the report aims at:

- Identifying the current single use plastics used in the country in large volumes, especially in the urban areas
- Understanding consumer behaviour and knowledge on single use plastic
- Identifying the main challenges and barriers for reducing single use plastic waste
- Understanding the current collection and recycling systems for Single use plastic and identifying the non-recyclables and the reasons behind that
- Analysing the findings to identify Single Use Plastics which can be phased down or phased out

3.1. Approach

The study was divided into two sections

- A. Consumer survey
- B. Field Visits and interviews in Delhi to assess informal sector operations

A. Consumer Survey

The consumer survey was conducted through a structured questionnaire (Questionnaire attached), which was field tested to test its veracity. The questionnaire was designed based on secondary research and informal discussions with select experts and included questions related to usage and disposal of select single use plastics which were more likely to be problematic and could be phased out or replaced. Our target audience for this survey was the urban middle class, which uses a host of single use plastics. The Internet has become increasing popular as a vehicle to deliver surveys and this was our primary tool for this part of the study. Since our audience was primarily urban middle class, which has easy access to internet and mobile networks, this medium, seemed suitable. The relatively low cost of delivery and data collection through use of Internet surveys was an added reason for using this medium. These also helped us to get responses from across the country. The method of sampling used was **Purposive Sampling**.

Small number of offline surveys was also administered in Delhi to include population which may be more comfortable in that. (Questionnaire attached in Annexure) The offline questionnaire was in local language, Hindi.

Total number of Surveys conducted was 453. The number of Male and Female respondents is almost equal. All age

categories were targeted. However, since the survey was primarily done online and through social media platforms, there were higher responses from age group 20-40.

	English	Hindi	Total
Number of Survey	390	63	453
Female Respondents	218	19	237
Male Respondents	167	44	211
Age Group – Under 20	26	3	29
Age Group – 20 – 40	295	28	323
Age Group – 40 - 60	57	27	84
Age Group – 60 plus	12	5	17

TABLE 4 Number of Survey for Consumer Behaviour on Single Use Plastic conducted

B. Field Visits and interviews to assess fate of Single use plastic

Preliminary survey was done in Madanpur Khadar in order to understand the current plastic recycling narrative, identify the areas where plastic waste is being handled, segregated and being sold further for recycling and the products which are being recycled.

Three main stakeholders were identified for this part of the study- based on people directly involved with collecting or segregating waste -

- Plastic Rag-Pickers or Waste Collectors
- Plastic Waste Segregators
- Dealers of Plastic Waste

The method used for conducting the survey was **Snowball sampling.** Snowball sampling refers to the method for collecting samples where the respondents of survey only direct you to the next respondent. This method of collecting survey was advantageous in this scenario, as there was lack of clarity of which areas the plastic recycling is happening or which stakeholders are involved in the same, owing to the drifting nature of the sector.

The number of surveys conducted for the informal sector survey was fifty. It was not possible to decide the number of surveys to be conducted based on a population formula as one was not exactly sure about the extent and areas where the survey had to be conducted. The survey forms were divided amongst the stakeholders as follows -

- 1. Rag Picker or Waste Collectors 19
- 2. Waste Segregators or Sorters 16
- 3. Dealers 15

3.1.1. STUDY AREA

The survey was conducted in the Delhi- NCR where the regions were identified on the basis of our previous studies, secondary research as well as inputs from field.

3.2. Plastic Products included in the Study

On the basis of the primary survey the following single use plastic products were identified to be surveyed -



a. Polythene Bags> 50 microns

Polythene Bags are the most focused upon single use plastic with widespread banning and restrictions however still being rampantly used across India. They are available in different qualities, colour and sizes.

b. Polythene Bags< 50 microns

A different section was made for these as the polythene bags of thickness less than fifty microns are banned by Plastic Waste Management Rules, 2016 as amended in 2018. Their presence in plastic collection and segregation sites would showcase non-implementation of the rules.



c. Plastic Boxes

This product is single use plastic boxes that are used for packaging. Rampantly used in the delivery by hospitality industry. It comes in various shapes, sizes, quality and colour.



d. Plastic Packaging

The film or sheets, wrappers, pouches, bubble wrap of plastic which are used to seal or ship a product are included in this category.

e. Plastic Personal Care Packaging Products

Examples of Personal care products are our face wash, body wash, conditioner and such products. These packaging are either made of plastic or are multi-layered (like toothpaste).

f. Plastic Sachet

Almost every FMCG Product has a miniature version selling in the market- whether it is shampoo, pickle or ketchup. These are small plastic packaging which have been included separately owing to their size it can be littered easily.

g. Cream Tube

These are separated from Plastic Care Packaging Products as they are often multi-layered as well.



h. Styrofoam Products

Thermocol or Styrofoam products are rampantly used and available in the markets which have a completely different recycling process as compared to other types of plastic products.



i. Plastic Disposable Plates and Cups

Any public event leaves behind these products. Styrofoam disposable cups and plates have been included in the above category; this category refers to only other types of plastic disposable plastic and cups.

j. Polypropylene Products



This category has been included especially for low grade quality polypropylene products which are often referred to as "farra" in the market. These are very low-quality thin plastic which are used as disposable glasses, biscuit trays, air seal for food and many other products. The reason for it being called farra is because the noise it makes when crushed.



k. Noodles Packets

The packaging of noodles packets is often made of low-quality thin plastic that is why they have been included as a separated category.



I. Multi-layered Packaging

The food condiments are packed in multi-layered packaging of which plastic and aluminium are an important part. Chips, biscuits and many other food items are packed in these multi-layered packets.



m. PET Bottle

One of the most widely used single use plastic they are used for the packaging of liquid consumables from water to milk.



n. Straws

Plastic straws are being rapidly used in the hospitality industry for consuming liquids such as cold drinks, mocktails and coconut water.



o. Plastic Cutlery

Plastic cutlery is being used in public events and accompanies food in online delivery.



p. Pens

Not all pens are single use plastic, only pens which cannot be refilled are being considered as singles use plastic in this case.



q. Balloon Sticks

Balloons are accompanied with plastic sticks these days instead of thread for holding them.



r. Milk Packets

Milk is packed in plastic bags of different sizes



4. LEGAL FRAMEWORKS

Plastics are an important material in our economy, and modern daily life is unthinkable without it. At the same time however, it can have serious downsides on the environment and health. Hence, the need to be regulated. Though globally there are many plastics regulation, it has been mainly on the downstream level to manage the waste. There are very limited upstream efforts or to reduce plastic waste generation.

Please find below some international and national effort to reduce and manage plastic waste.

4.1. International

Governments have struggled for decades to reduce marine plastic debris. The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) was signed in1973, although a complete ban on the disposal of plastics at sea was not enacted until 1988. Even though 134 countries agreed to eliminate plastics disposal at sea, research has shown that the problem of marine debris has worsened since MARPOL 73/78 was signed. This may be because the marine debris problem is more related to incorrect disposal of waste on land than direct disposal in sea. As for reducing the use of plastic, definition of single use plastic is still under scrutiny and very few countries have taken steps to phase out disposable plastic as a whole. But more than 60 countries have introduced some measures to curb single-use plastics waste such as imposing bans and levies. Most countries have taken a phased approach and, in some cases, complimented with economic instruments.

PLASTIC BAG BANS

Plastic Bags, amongst all the SUPs, are the most targeted products when it comes to a restrictions or bans. In 2015, EU passed a binding legislation that mandates each nation within the EU to take measures to reduce annual average consumption of plastic bags to 90 lightweight bags per citizen by the end of 2019 and 40 per capita by the end of 2025. Alternatively, a nation needs to ensure that by the end of 2018, no more light plastic bags are handed over free of charge to shoppers. The EU considers plastic bags to be lightweight if < 50 μm, which includes most plastic carrier bags used in the EU. Besides this, there have been efforts by individual countries, as listed below.

Benin	2018	National level policy ban on import, production, sale and use of non-biodegradable plastic bags
Botswana	2007	National level policy Levy on retailer. No enforcement upon retailers to charge for plastic bags. Retailers decide if and how much to charge.
Burkina Faso	2015	National level policy Ban on production, import, marketing and distribution of non-biodegradable plastic bags
Cameroon	2014	National level policy on ban on non-biodegradable plastic bags.
Cape Verde	2017	National level policy on ban on the sale and use of plastic bags
Chad		Ban on the importation, sale, and use of plastic bags in the capital city, N'Djamena
Côte d'Ivoire	2014	National level policy on Ban on the importation, production, use and sale of non-biodegradable plastic bags <50µ
East Africa	2017	The East African Legislative Assembly (EALA) introduced a ban on the manufacturing, sale, importation and use of polythene bags under the East African Community Polythene Materials Control Bill 2017
Egypt	2009	Ban on the use of plastic bags in Hurghada. Distribution of 50,000 cloth bags for free by the Hurghada Environmental Protection and Conservation Association, together with letters explaining the health and environmental reasons behind the campaign
Eritrea	2005	National Level Policy on ban on the importation, production, sale, and distribution of plastic bags
Ethiopia	2007	National Level Policy on ban on production and importation of non-biodegradable plastic bags <30 μ
Gambia	2015	National level policy on ban on the sale, importation and use of plastic bags
Guinea-Bissau	2016	National level policy on ban on the use of plastic bags
Kenya	2017	National level policy on ban on the importation, production, sale, and use of plastic bags.
Malawi	2015	National level policy on ban on the use, sale, production, exportation and importation of plastic bags <60µ
Mali	2012	National level policy on ban on the production, importation, possession, sale and use of non-biodegradable plastic bags.
Mauritania	2013	National level policy on ban on the manufacture, use and importation of plastic bags.
Mauritius	2016	National level policy on ban on the importation, manufacture, sale or supply of plastic bags, with II Types of plastic bags for essential uses and hygienic and sanitary purposes exempt (for example roll-on bag for meat products, waste disposal bags, bags as integral part of packaging, bags manufactured for export)
Morocco	2009, 2016	First there was a ban on the production, importation, sale and distribution of black plastic bags, which has now been extended to all plastic bags.
Mozambique	2016	National level policy on Ban on the production, importation, possession and use of plastic bags <30µ.
Niger	2015	National level policy on Ban on production, importation, usage and stocking of plastic bags.
Rwanda	2008	National level policy on ban on the production, use, importation and sale of all polyethylene bags.
Senegal	2016	National level policy on Ban on the production, importation, possession and use of plastic bags <30µ
Somalia	2015	Ban on disposable plastic bags in Somaliland.
South Africa	2003	National level policy on ban on plastic bags <30µ and levy on retailer for thicker ones
Tanzania	2006	National level policy Ban on plastic bags and bottles. Local ban (Zanzibar) on the importation, distribution and sale of plastic bags <30µ.
Uganda	2009	National level policy on ban on lightweight plastic bags <30µ.
7 imhahwe	2010.2017	First a national level policy on ban on plastic bags <30µ and levy on consumer for thicker ones.

Bangladesh	2002	National level policy on ban on polyethylene plastic bags< 20 microns.
Bhutan	2009	National level policy on ban on plastic bags.
China	2008	National level policy on ban on non-biodegradable plastic bags <25µ.
Hong Kong	2009, 2015	Legislation passed to impose a 50 HK cent levy on plastic bags. In 2009, the levy was imposed at major supermarkets and retail outlets. In 2015, the levy was widened to all retailers. Exemptions from the ban were in place for hygiene reasons in the handling and storage of fresh food.
Indonesia	2016	Levy on plastic bags imposed on customers (equivalent to \$0.015 per bag) at selected retailers in 23 cities.
Israel	2017	National level policy on ban on bags <20 μ and levy on thicker ones in supermarkets (around \$0.03)
Malaysia	2011, 2017	Penang state introduced MYR 0.20 charge on plastic bags, in line with the campaign: "No free plastic bags". In 2017 federal territories Ban on non-biodegradable plastic bags in Malaysia's Federal Territories (Kuala Lumpur, Putrajaya, and Labuan)
Mongolia	2009, 2018	National level policy on ban on the importation and use of non-biodegradable plastic bags <25µ. The gov- ernment of Mongolia decided to ban single-use plastic bags across the country starting from March I, 2019.
Myanmar	2009, 2011	In 2009 a ban on the use of small and thin plastic bags was introduced in Mandalay and Nay Pyi Taw. In 2011 a ban on the production, storage, and sale of polyethylene bags was introduced in Yangon
Nepal	2016	The Plastic Bag Directive had restricted production, sales, and distribution of plastic bags below 30 mi- crons.
Pakistan	2013, 2017, 2018	Ban on the manufacturing, sale and usage of non-degradable plastic products in Punjab (2013). Ban on certain non-degradable plastic products, including carrier bags, in Sindh (2018). Ban on the sale, purchase, and use of polyethylene bags in the Islamabad Capital Territory, and introduction of oxo-biodegradable plastic bags (2013). Ban on the manufacture, importation, sale, and use of non-biodegradable plastic bags and regulation of oxo-biodegradable plastic products in Khyber Pakhtunkhwa (2017).
Philippines	2019	Currently, there are at least 20 cities and provinces in the Philippines that have some form of policy to regulate the use of plastic bags.
Sri Lanka	2017	National level policy on ban on the import, sale, and use of polyethylene bags <20 μ .
Taiwan	2018	Starting 2018, businesses like pharmacies, bakeries and beverage shops could no longer offer customers free plastic bags.
Thailand	2020	Thailand began the year with a ban on single-use plastic bags at major stores.
Vietnam	2012	National level policy on levying non-biodegradable plastic bags are taxed by weight at VND 40,000 (\$1.76) per kilogram

Antigua and Barbuda	2016, 2017	National level policy on ban on the use and importation of plastic bags (2016).
Argentina	2009, 2017	Ban on the use of polyethylene bags in Córdoba (2009). Ban on non-biodegradable plastic shopping bags <50µ in Buenos Aires (2017).
Belize	2018	National level policy on ban on single-use plastic shopping bags.
Brazil	2009, 2015	Requirement to substitute polyethylene and polypropylene bags with alternatives, or, if not done, to take back any quantity of plastic bags from any source and dispose of them properly and compensate the public by giving them a discount if they bring their own bag, or to pay them with food products for every 50 plastic bags they bring in Rio de Janeiro (2009). Ban on non-biodegradable plastic bags in Sao Paulo (2015).
Chile	2014, 2017	Ban on polyethylene bags except for perishable food products (fresh food such as meat, seafood, etc.) in Punta Arenas (2014). Ban on the sale of plastic bags in 102 coastal villages and towns (2017).
Columbia	2017	National level policy on ban on disposable plastic bags smaller than 30x30 cm and levy on consumer on single-use plastic bags (20 Colombian pesos, around \$1)
Ecuador	2015	Ban on plastic bags in the Galápagos Islands.
Guatemala	2017	Ban on plastic bags and Styrofoam containers in San Pedro La Laguna. Cantel, Quetzaltenango and San Juan Sacatepéquez have introduced similar laws.
Haiti	2013	Ban on the importation and production of plastic bags and Styrofoam containers.
Honduras	2016	Ban on plastic bags instituted at the municipal level in Roatán, Utila, and Guanaja
Mexico	2010, 2018	Levy on plastic bags where Retailers in Mexico City must charge for them (2010). Ban on disposable plastic bags in Queretaro City (2018).
Panama	2018	National level policy on ban on the sale and use of non-biodegradable plastic bags
Puerto Rico	2016	A ban on the use of plastic bags commenced on 24 December 2016
St. Vincent and the Grenadines	2017	The country declared a ban on the distribution, sale or use of plastic bags.



European Union	2015	Member states must ensure that by the end of 2019 no more than 90 lightweight (< 50μ) bags are consumed per person per year. By the end of 2025 that number should be down to no more than 40 bags per person. Member states can choose whether to introduce bans, taxes, or other policy tools.
Belgium	2007, 2017	National level policy levy on consumer to reduce distribution of free plastic carrier bags. Ban on non-com- postable plastic bags <50µ in the Brussels Capital (2017).
Bulgaria	2011	National level policy to levy on supplier on PE bags <15µ (around \$0.10), increased every year until 2015
Croatia	2014	National level policy to levy on supplier, with levies to go to the Environmental Protection and Energy Effi- ciency Fund.
Cyprus	2018	National level policy to levy on consumer (μ 0.05, around \$0.06) for plastic bags in supermarkets
Czech Republic	2018	National level policy to levy on consumer for plastic bags >I5µ. Retailers determine the price, but charge must at a minimum cover the production cost of the plastic bag
Denmark	1994	National level policy to levy on supplier for plastic bags. Fee passed on to retailers, who in turn pass it on to consumers (currently a bag costs around \$0.56 per bag)
Estonia	2017	National level policy to levy on consumer on plastic bags <50µ (exemption of very light weight bags used to ensure hygiene and prevent food waste). Avoidance of sale or free of charge oxo-degradable plastic carrier bags
France	2015, 2016	Ban on lightweight single-use plastic carrier bags (<50µ and <10litres) in 2017 on all other plastic bags except compostable bags. Prohibition of the production, distribution, sale, provision or use of oxo-degrad-able plastic bags (2016).
Germany	1991	Legislation passed to ensure that retail stores providing plastic bags pay a tax or levy. Most retails stores charge 5 or 10 Euro cents per bag. Following the EU announcement, the country will charge 20 cents per bag
Greece	2018	Levy on consumer (€ 0.034, around \$0.04) for non-biodegradable plastic bags <50µ. The levy raised to € 0.07 (\$0.086) in 2019. Businesses will be allowed to charge customers for thicker bags.
Hungary	2012	Nation level policy to levy on supplier. Re-regulation of the environmental protection fee obliged producers and distributors to pay the fee in any case, which they incorporated into the products' price. Retailers volun-tarily put a fee on plastic bags.
Ireland	2002 with reviews	National level policy to levy on consumer for plastic bags (initially set at €0.15 and later augmented to €0.22, around \$0.26). Aims to limit use to a maximum of 2l bags per person per year. In 2011 legislation allowed the levy to be amended once a year, with a ceiling of €0.70 (\$0.86) per bag
Italy	2011, 2018	National level policy on ban on non-biodegradable plastic bags <100µ, with exemption of reusable plastic bags (2011)- fully effective from 2014.Levy on consumer for lightweight plastic bags in supermarkets and grocery stores (around \$0.025 – \$0.12) (2018). Only biodegradable and compostable lightweight plastic bags are allowed to be provided or sold
Latvia	2009	National level policy on ban on levy on retailer for plastic carrier bags (with two different rates for single and multiple use bags and depending on weight)
Lithuania	2016	National level policy on levy on consumer. Prohibition of free lightweight plastic bags with a thickness between 15 and 50µ.
Malta	2019	National level policy on levy on consumer on all sorts of plastic bags (€0.15, around \$0.18).
Netherlands	2016	National level policy on levy on consumer. Very lightweight bags for primary packaging are exempt. While businesses have the freedom to decide how much they will charge, the official guideline is €0.25 per bag (around \$0.30).
Portugal	2015	National level policy on levy on supplier. The charge of € 0.10 (around \$0.12) per bag between 15-50µ was mostly passed on to the consumer
Romania	2009, 2018	National level policy on levy of €0.05 (around \$0.06) on consumer on non-biodegradable plastic bags (2009). Ban on plastic bags <50µ in supermarkets and <15µ on national markets.
Slovakia	2018	National level policy on levy on consumer for plastic bags between 15 and 50µ
Spain	2011, 2017	Levy on consumer for plastic bags in Andalusia (€0.05, around \$0.06). From 2012, increases to €0.10. Ban on free disposable plastic bags, including biodegradable and oxo-degradable ones in Catalonia.
Sweden	2011, 2017	Levy on consumer for plastic bags (£0.05) in Wales (2011). National level policy on law that requires super- markets to educate customers on the environmental effects of plastic bags (2017).
United Kingdom	2013, 2014, 2015	Levy on consumer for plastic bags (£0.05, around \$0.07) in Northern Ireland (2013). Levy on consumer for plastic bags in Scotland (2014). Levy on consumer (£0.05, around \$0.07) for plastic bags to be charged by companies with 250+ employees and on a voluntary basis for smaller retailers in England (2015).





Canada	2007, 2010, 2018	Ban on plastic bags in Leaf Rapids (Manitoba) (2007). Ban on single-use plastic bags (<571µ) in in Mu- nicipality of Wood Buffalo with exceptions (2010). Ban on the sale or give-away for free of plastic shopping bags in Thompson (Manitoba) (2010). Ban on plastic bags <50µ in Montreal (Quebec) (2016).
nited States of America	2010, 2011, 2012, 2013, 2015, 2016, 2017	Levy on consumer for plastic bags ($\$0.05$) in Washington, DC (2010).Ban on the sale and use of petro- leum-based plastic bags (some exceptions possible for fresh and frozen products and others) (2011). Ban on single-use plastic bags in Hawaii. 2013 : Big Island Hawaii, 2018 : Honolulu (ban and fee), 2011 . Ban on single-use checkout plastic bags and levy on consumer on compostable bags, recycled paper bags or reusable (>125 uses) bag of $\$0.10$ in the county and city of San Francisco (2012). Ban on single-use plastic bags (< 101μ) in Austin, Texas (2013). Ban on single-use plastic bags and levy on thicker reusable ones (US $\$0.10$) in California (2016). Levy on consumer plastic bags in Chicago ($\$0.07$) (2017). Ban on sin- gle-use plastic bags, including bags labelled with biodegradable, degradable, decomposable or similar, and voluntary levy on thicker (> 57μ) plastic bags in Seattle (2017).

Australia	2003, 2009, 2011, 2013, 2018	Ban on non-biodegradable plastic checkout bags in Coles Bay (2003). Ban on lightweight plastic bags in South Australia (2009). Ban on lightweight plastic bags in the Australian Capital Territory (2011). Ban on plastic bags <35µ in the Northern Territory (2011). Ban on plastic bags <35µ in Tasmania (2013). Ban on plastic bags <35µ in Queensland, Ban on lightweight plastic bags in Victoria and in Western Australia (2018).	
Fiji	2017	National level policy on levy on consumer, FJD 0.10 (\$0.05) per plastic bags (2017).	
Papua New Guinea	2016	National level policy on ban on non-biodegradable plastic shopping bags.	
Vanuatu	2018	National level policy on ban on manufacture, use and import of single-use plastic bags. Bags to wrap and carry fish or meat are exempt.	
Marshall Islands	2017	National level policy on ban on importation, manufacture and use of single-use plastic carrier bags.	
Palau	2017	National level policy on ban on the importation and distribution of plastic shopping bags.	

BAN ON SINGLE USE PLASTIC, BEYOND PLASTIC BAGS

The European Commission proposed on May 2018 new EU-wide rules to target the 10 single-use plastic products most often found on Europe's beaches and seas. In addition, Producers fishing gear containing plastics will be required to cover the costs of waste collection from port reception facilities and its transport and treatment. They will also cover the costs of awareness-raising measures.

TABLE 6: EU action on Single Use Plastic

Bags	Producers to contribute to awareness-raising, clean-up, collection and waste treatment of lightweight plastic carrier bags, in addition to existing measures in the existing Plastic Bags Directive.
Beverage containers	Producers to contribute to awareness-raising, clean-up, collection and waste treatment of beverage containers; product design requirements to attach caps and lids to beverage containers; 90% separate collection target for plastic bottles.
Cigarette Butts	Producers to contribute to awareness-raising, clean-up, collection and waste treatment of cigarette butts and other plastic tobacco product filters.
Cotton buds	Ban on single use cotton buds made with plastic, to be replaced on the market with sustainable alternatives.
Crisp packets/sweet wrappers	Producers to contribute to awareness-raising, clean-up, collection and waste treatment of plastic packets and wrappers
Cutlery, plates, straws & stirrers	Ban on single use cutlery, plates, straws and stirrers made with plastics, to be replaced with more sustainable alternatives.
Cups for beverages	Significant national consumption reduction of plastic cups for beverages. Producers to contribute to awareness-raising, clean-up, collection and waste treatment.
Food containers	Plastic sticks for balloons to be banned and replaced with sustainable alternatives. On balloons, producers to contribute to awareness- raising, clean-up, collection, waste treatment and introduce new labelling on the environmental impact of the product and recycling options for consumers.
Sticks for balloons and balloons	Plastic sticks for balloons to be banned and replaced with sustainable alternatives. On balloons, producers to contribute to awareness- raising, clean-up, collection, waste treatment and introduce new labelling on the environmental impact of the product and recycling options for consumers.
Wet wipes and sanitary items	New labelling requirements for sanitary towels and wet wipes to inform consumers on environmental impact of the product and how to dispose of it properly. Producers to contribute to awareness-raising, clean-up, collection and waste treatment of wet wipes.

Many countries under EU are now taking actions. But apart from that, there are other countries also making efforts to reduce single use plastic. Some have been listed below.

Antigua and Barbuda

Apart from plastic bag ban, in 2017 the country put in place a ban on importation and use of food service containers which includes clamshell and hinge containers, hot dog containers, bowls, plates, and hot and cold beverage cups. In 2018, it was extended to ban on importation and use of plastic utensils (spoons, forks and knives), straws, fruit trays, meat trays, vegetable trays and egg cartons and to ban on importation and use of "naked" Styrofoam coolers. The ban will extend to all businesses within the food service industry to include large and small supermarkets, grocery stores and the catering sector in Antigua and Barbuda. Airline Carriers, Private Charters and large Cruise Liners are exempted from the ban as of now.

Aruba

The Parliament of Aruba has officially banned, in November 2019, certain single use plastics. This means that any disposable, single use plastics, such as: plastic cups, straws, utensils, containers, and stirrers are now prohibited. Starting July 2020, all import, sale and production of any single use plastics will be penalized.

Belize

Belize approved (March, 2018) a proposal to reduce plastic and Styrofoam pollution. Beginning 2019, the ban is put in place on Styrofoam, disposable plastic containers and cutlery, and plastic straws.

China

China has recently announced measures to cut down single use plastics. By the end of 2020, non-biodegradable plastic bags will be largely banned from major cities, and single-use straws will be prohibited in restaurants across the country. The ban will extend to all cities and towns by 2022 and to markets selling fresh produce by 2025. Restaurants have been also asked to reduce single-use plastic items by 30% by 2025.

Costa Rica: Total single-use plastic ban

Costa Rica aims to become the first country in the world to ban all single-use plastics by 2021. On 5 June 2017, World Environment Day, the government announced a National Strategy to phase out all forms of single-use plastics by 2021 and replace them with alternatives that biodegrade within six months. The ban aims at eliminating not only plastic bags and bottles, but also other items such as plastic cutlery, straws, Styrofoam containers and coffee stirrers. The Strategy promotes the substitution of single-use plastic through five actions: (i) municipal incentives, (ii) policies and institutional guidelines for suppliers, (iii) replacement of single-use plastic products, (iv) research and development, and (v) investment in strategic initiatives.

Dominica

The island nation announced its aim to completely ban common plastics and single-use Styrofoam cups and food containers -- effective January 2019.

France

France plans to Eliminate All Single-Use Plastics by 2040. As a first step, starting January 1, 2020 three single-use plastic products have been banned: plates, cups, and cotton buds. Next year, items including disposable cutlery, plastic takeout lids, confetti, drink stirrers, foam containers, plastic straws, and produce packaging will all be forbidden. Vendors will legally have to allow customers to use their own containers, and there will even be penalties for those who use excessive plastic packaging. By 2022, the French public will not have the option to buy plastic tea bags, fast food toys, or disposable dishes in restaurants. Water fountains will become mandatory in public buildings, to reduce the plastic water bottles.

Guatemala

Single-use plastic bags, straws, plates, glasses, mixers or agitators, containers or containers for food storage and transport are prohibited by Government order in 2019. The ban also covers such products made from expanded polystyrene, known as duraport, in its different presentations. The agreement establishes a term of two years, from the moment the publication takes effect, so that all the individual or legal persons that use this type of products replace them definitively with other articles and inputs made with compostable material.

Guyana

The country introduced ban on all Styrofoam products from 2016. The year 2021 has been designated for the systematic ban of single-use plastics. The Styrofoam ban has put an end to the use, manufacture, importation and distribution of all Styrofoam products, inclusive of cups, plates, egg cartons, meat and vegetable trays, hot and cold beverage cups. As far as the legislation governing the ban is concerned, a Guyanese or a Guyanese entity found to be in contravention (use importation or manufacturing) could face fines of no less than \$50,000. Guilty food establishments found possessing and selling food in the Styrofoam containers will be served warnings, and could face fines from a summary conviction upwards of \$100,000.

Jamaica

As of January 1, 2020, the Government imposed a ban on the local manufacture, distribution and use of expanded polystyrene foam products used in the food and beverage industry. This follows the implementation of phase one of the ban on the importation of the items on January 1, 2019. Items banned in the country are plastic bags, straws and polystyrene foam containers.

Japan

Japan has set the goal of cutting disposable plastic waste by 25 percent by 2030 and completely recycling or reusing all such waste, including items used in scrapped household electric appliances and auto parts, by 2035.

Malaysia

In 2017 federal territories banned non-biodegradable food containers in Malaysia's Federal Territories (Kuala Lumpur, Putrajaya, and Labuan).

Marshall Islands

The Republic of the Marshall Islands banned the importation, manufacture and use of Styrofoam cups and packaging in March 2017.

Samoa

The South Pacific island nation of Samoa moved to ban most single-use plastics in June 2018. The ban, which took effect in January 2019, initially targeted plastic shopping bags, packaging, and straws, but will eventually widen to include styrofoam products.

South Korea

In 2018, the country banned the use of single-use cups in cafes and fast-food chains and only multiuse cups can be used inside the establishments. In 2019, it also prohibited the use of disposable plastic shopping bags in supermarkets.

Sri Lanka

The Sri Lankan government, through a gazette banned the use and manufacture of Styrofoam boxes in 2017. Accordingly, the manufacture of food containers, plates, cups and spoons made out of expanded polystyrene has been banned for use in the country.

Taiwan

From 2019, Single-use plastic straws are not to be provided to those making dine-in purchases at department stores, educational institutions, fast food outlets, government agencies and shopping centers.

United Kingdom

In the United Kingdom, a ban was announced on the sale of plastic straws, drink stirrers and plastic-stemmed cotton buds. Plastic stirrers will be subject to a total ban from 6 April 2020. However, plastic-stemmed cotton buds, although restricted from general sale to the public, will still be available. Medical and scientific laboratories will be able to buy them for use in research and for forensic tasks in criminal investigations. Registered pharmacies will be allowed to sell plastic straws over the counter or online. Catering establishments such as restaurants, pubs and bars will not be able to display plastic straws or automatically hand them out, but they will be able to provide them on request. UK also eliminated plastic microbeads, which can no longer be used in "rinse-off" cosmetic and personal care products.

Vanuatu

On July 30, 2017, its independence day, the Pacific nation of Vanuatu announced the beginning of a phasing out of plastic bags and bottles. In July 2018, Vanuatu banned single-use plastic bags, drinking straws and Styrofoam food containers. Plastic cutlery, polystyrene cups, plastic drink stirrers and types of food packaging are also set to be outlawed. **Vanuatu is the first country in the world to ban the sale and use of disposable nappies from December, 2020.**

Zimbabwe

Zimbabwe banned the use of polystyrene — most often used in the form of Styrofoam food containers — in 2017, a legislative shift that caused some controversy among food service retailers. The government also announced

Vanuatu is the first country in the world to ban the sale and use of disposable nappies from December, 2020

that it would issue fines between \$30 and \$5,000 Zimbabwean dollars to anyone caught breaking the law. After banning polystyrene, the Zimbabwean government upped its game in 2018 when it began a phase-out of other single-use plastics, like bags.

New York City

In 2015, single-use Styrofoam containers (EPS foam) were banned in New York City. The ban was challenged by a coalition of recycling firms and plastic manufacturers, who claimed that Styrofoam is recyclable and proposed a recycling plan for the foamed plastic items. The ban was overturned, that same year, only to be reinstated in 2017, following a report by the New York City Department of Sanitation which found that it is not possible to recycle Styrofoam in a manner that is economically feasible or environmentally effective.

Seattle

Seattle is believed to be the first major U.S. city to ban single-use plastic straws and utensils in food service in July 2018. The city's 5,000 restaurants have been mandated to use reusable or compostable utensils, straws and cocktail picks, though the city is encouraging businesses to consider not providing straws altogether or switch to paper rather than compostable plastic straws.

San Francisco

Starting July 1, 2019, the law restricts the distribution of single-use plastic straws, including compostable plastic straws. Acceptable single-use straws (such as paper straws) can only be made available upon request. A single-use plastic straw may only be provided to a customer who specifically requests a plastic straw to accommodate a disability or medical need. Food & beverage vendors are also not allowed to provide the following single-use plastic accessories: Plastic beverage plugs, Plastic cocktail sticks, Plastic stirrers and Plastic toothpicks. Even acceptable single-use food and beverage accessories must not be included automatically in a customer's order for dine-in, take-out or delivery. The following single-use food and beverage accessories may be made available only upon request or in a self-service area: Beverage plugs, Chopsticks, Condiment packages and portion cups, Lids, Napkins, Sleeves, Stirrers and Utensils.

4.2. Plastic Regulations in India

India is one of the largest consumers of plastics products. India has a fairly low per capita use of plastics at 11 kilograms a year, compared to 109 kilograms in the United States, 65 kilograms in the Europe, 38 kilograms in China and 35 kilograms in Brazil²⁸. But with a population of 1.35 billion, this translates into huge amounts of usage and then finally wastes.

There are currently several regulations in India to limit and control the plastic wastes - some of these at national level and some at state or city level. At the national level we have two key regulations that are related to plastic waste- one is Municipal solid waste and the other is on Plastic waste management. But before we look at them more closely, let us look at the State level actions- which are mainly on plastic carry bags. As in international bans, the bans across Indian states is also mainly restricted to plastic bags. There have been also some new frameworks notified in the last two years on single use plastics, mainly extending to disposable cups, plates and cutlery. Some of these were triggered by Prime Minister Narendra Modi's 2019 Independence Day speech, where he spoke about 'freedom for India from single-use plastic'.

Prior to this, Union minister for environment, forest and climate change had declared on World Environment Day 2018 that the country would try to "phase out" single-use plastic by 2022. India reinforced its commitment at the fourth



States/UTs with plastic bag restrictions

UN Environment Assembly in Nairobi last March. No national policy instrument, however, has been announced since then. More than 20 states, however, have notified a full or partial ban on such plastic, Maharashtra being the first. Some states like Telangana, Odisha, Maharashtra, Tamil Nadu, and Himachal Pradesh banned plastic bottles and Tetra packs, single-use straws, plastic/Styrofoam tea cups/containers, etc. But many like Bihar or Nagaland banned only polythene bags.

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State	Year	Status
Andaman and Nicobar Islands	2015	Complete ban on plastic carry bags
Andhra Pradesh		Ban on use of plastic carry bags in Tadipatri, Vijayawada, Tirupati & Bobbili districts
Arunachal Pradesh		Ban on use of plastic carry bags banned in East Siang, Tawang, Leparada Changlang, Kameng & Tirap districts
Assam	2019	Ban on single use plastic items including plastic carry bags.
Bihar	2018	Complete Ban on plastic bags irrespective of thickness. Exemptions included plastic bags above 50 microns thickness for collection, storage, and disposal of biomedical waste, plastic containers used for raising plants in nurseries and for dairy products packaging.
Chandigarh	2008	Complete Ban on plastic carry bags. Compostable carry bags are allowed. Further, there is prohibition on use of plastic/non- woven plastic carry bags, plastic plates, glasses & other allied items.
Chhattisgarh	2017	Complete ban on plastic carry bags
Daman, Diu & Dadra Nagar Haveli		Complete ban on plastic carry bags
Haryana	2013	Complete ban on plastic carry bags
Himachal Pradesh		Complete ban on plastic carry bags
Jharkhand	2017	Complete Ban on plastic carry bags
Karnataka	2016	Complete ban on manufacture, use and sale of plastic carry bags
Kerala	2015	Complete ban on plastic carry bags in Thiruvananthapuram, Kannur and Kottayam District during the pilgrimage season.
Lakshadweep		Complete ban on import & use of polythene & plastic material for packing carrying of consumer goods
Madhya Pradesh	2017	Complete ban on the plastic carry bags in the entire State
Maharashtra	2018	Complete ban on the plastic bags irrespective of size and thickness.
Mizoram	2019	Ban on plastic carry bags.
Nagaland	2019	Complete ban on plastic carry bags
Odisha	2018	Complete ban on plastic carry bags in six Municipal Corporation /Municipality limits of Bhubaneshwar, Cuttack, Berhampur, Rourkela, Sambalpur and Puri.
Punjab	2016	Complete ban on plastic carry bags
Puducherry	2019	Complete ban on single use plastics
Rajasthan	2010	Complete Ban on manufacture, storage, import sell or transport of plastic carry bags
Sikkim	1998	Complete ban on plastic carry bags
Tamil Nadu	2019	Complete Ban on manufacture, store, supply, transport, sale or distribute and use plastic carry bags.
Tripura	2018	Complete Ban on all kinds of plastic carry bags. Monetary penalty for use, sell, store and import of banned plastic carry bags.
Uttarakhand	2017	Complete ban on sale, use & storage of Plastic carry bags.
Uttar Pradesh	2018	Complete ban on manufacture, sale, use, storage, transport, import & export of all kinds of disposable Plastic carry bags in Nagar Panchayat, Nagar Palika, Nagar Nigam or industrial township of the State
West Bengal	2001	Ban of use & sale of plastic carry bags in ecologically fragile areas and in certain heritage & tourist spots.

TABLE 7: Indian State wise ban on single use plastic (Source: CPCB, SPCB websites and newspaper articles)

TABLE 8: Indian State wise ban on single use plastic (Source: SPCB websites and newspaper articles)

State	Year of Ban	Policy Framework
Tamil Nadu	2019	The ban primarily covers the use of plastic carry bags, plastic plates, plastic cups, plastic flags, small plastic sachets used in packaging water, among others. Exclusions, however, apply for milk, curd, oil, and medicine packaging.
Maharashtra	2018	Maharashtra has banned the use, manufacture, transport, wholesale and retail sale and storage, import of plastic bags, and disposable products made out of plastic and thermocol for decoration purposes
		Other banned items include plastic bags with a handle and without handle, disposable cups, and plates, spoons, forks, glasses, and containers. The state also restricts the use of plastic straw, non-woven polypropene bags, pouches and any other plastic used to store, package and transfer food items.
		Exemptions include Medicines, drugs, plastic used for handling plastic waste, food grade virgin plastic and compostable plastic
Himachal Pradesh	2018	In 2018, the state issued a notification banning thermocol cutlery, including cups, plates, glasses and spoons or any other item in the state however this has been challenged in the Supreme court.
Telangana	2018	A ban on single-use plastic in the offices of all urban local bodies and civic municipal bodies.
Odisha	2018	Complete Ban on bottled drinking water of less than 200 ml capacity, disposable cutleries, cups and plates, thermocol decorative material and polythene sheets of less than fifty microns. Plastics for carrying and transporting garbage and containers like cup for milk products including curd and ice-cream, polythene packaging materials used in plant nurseries, horticulture, agriculture and healthcare sector like medicines, blood transportation bags, syringe, sample or specimen bags, re-sealable bags, medical instruments and accessories as well as packing materials used for wrapping of any items at manufacturing stage have been exempted from the restrictions. These restrictions are only in six cities including Bhubaneswar, Cuttack, Rourkela, Sambalpur, Berhampur and Puri.
Gujarat	-	Complete ban on plastic products in Gandhi Nagar.
Jammu and Kashmir	2019	Non-biodegradable disposable products being used in daily chores have been banned in the state
Sikkim	(1998) (2016)	In 2016, the state banned the use of packaged drinking water in government offices and government events and it banned the use of Styrofoam and thermocol disposable plates and cutlery in the entire state
Karnataka	2019	The urban local body of Bengaluru capital of Karnataka has banned plastic Banners, Buntings and Flex, non-woven polypropylene bags, plastic cling films, disposable spoons, cups, plates, sheets spread on dining tables, items made of thermocol.
Uttarakhand	2017	Complete ban on sale, use & storage of Plastic carry bags, plates, glasses, cups & packaging Items.
Uttar Pradesh	2018	Complete ban on manufacture, sale, use, storage, transport, import & export of all kinds of disposable Plastic plates, glasses, cups, spoons, tumblers, etc. made up of plastic or thermocol disposable after one-time use in Nagar Panchayat, Nagar Palika, Nagar Nigam or industrial township of the State.

Challenges associated with the ban in Indian States

Plastic bags have been part of the Indian lifestyle for now almost a decade, especially in the urban areas. And hence any move to restrict them or prohibit them would require much effort. Also, since for industry or vendors, this was the cheapest and most convenient option, there was bound to be resistance from them. The plastic bag bans or restrictions have met with little success in most cases and there have been multiple reasons for its failure. The key reasons

- Lack of efforts from administration to implement the ban-There has been little action to stop plastic bag manufacturing or transport. Also, administration has not taken any action to stop vendors to dole out plastic bags or to penalize consumers who are taking the banned bags. Even in cases where there has been action, it is for limited time- which meant that the bags vanished form the market for a while, but came back soon.
- Non- availability of alternatives- There has been very little effort to ensure availability of other materials. Also, lack of support to alternative industry means that they are relatively expensive and hence consumers or vendors do not prefer it.
- Low Public participation-Community interest and involvement is of paramount importance when it comes to successful implementation of any environmental initiative. Government has failed to initiate behaviour change, though it has been able to create awareness at many levels.

Government has also faced stiff resistance from the Plastic industry. For example, in case of Delhi, the ban was challenged in the court and could not be implemented. In case of bans on single use plastic as well, similar problems have surfaced. The All India Plastic Manufacturers Association contends the ban in Maharashtra has cost manufacturers millions of dollars and tens of thousands of workers their jobs, and the Tamil Nadu Plastics Manufacturing Association has challenged the Tamil Nadu ban in court.
4.2.1. PLASTIC WASTE MANAGEMENT REGULATIONS IN INDIA

The first government rule on Plastics waste in India was the Recycled Plastics (Manufacture & Usage) Rules, 1999(as amended in 2003)' under the Environment (Protection) Act, 1986 to regulate the manufacture, sale and use and recycling of plastic bags. These rules provided that plastic carry bags should have a minimum thickness of 20 microns; carry bags or containers made of recycled plastic shall not be used for packaging of food stuffs and recycling of plastic waste in accordance with BIS specifications. Powers were delegated to the State Pollution Control Boards / Pollution Control Committees for taking action for violation of Rules. The intent of this regulation was to control the packaging of food products in recycled plastics and to manage the severe littering problem. As the plastic problem grew in magnitude the need was felt for specific regulations on Plastic Waste. The government introduced Plastic Waste (Management and Handling) in 2011 under the Environment Protection Act, 1986 to address the issues at hand.

Regulatory Provisions of Plastic Waste (Management and Handling) Rules, 2011

The government notified Plastic Waste (Management and Handling) Rules, 2011 superseding Recycled Plastics Manufacture and Usage Rules 1999. They introduced a minimum thickness of plastic carry bags of 40 micron. Extended Producer Responsibility was introduced for manufacturers of Plastics, where the municipal authorities may avail funding for setting up collection centres for plastic. Plastic, in any form, was banned in packaging of gutka, pan masala and tobacco.

Regulatory Provisions of Plastic Waste Management Rules, 2016

The Government notified the Plastic Waste Management Rules, 2016, superseding of the earlier Plastic Waste (Management and Handling) Rules, 2011. The minimum thickness of plastic carry bags was increased from 40 microns to 50 microns. The rules, which were admissible only up to municipal areas, were now extended to all villages. The responsibility for implementation of the rules was given to Gram Panchayat. In the 2011 Rules Extended Producer Responsibility was left to the discretion of the local bodies. However in the 2016 Rules the producers and brand owners have been made responsible for collecting waste generated from their products. They have to approach local bodies and by involving state urban development department for formulation of planning the plastic waste management within the prescribed timeframe. Even multi-layered packaging was brought within the ambit of plastic waste management.

The amendment, which came in 2018, omitted the explicit pricing of carrying bags. It earlier required every vendor, who sold commodities in a carry bag, to register with their respective urban local body and pay a minimum fee of Rs 48,000 annum (4000/month). The term 'non-recyclable multi-layered plastic if any' has been substituted by 'multi-layered plastic which is non-recyclable or non-energy recoverable or with no alternate use'. This gives plastic producers a scope to argue that their products can be put to some other use, if not recycled. This move tantamounts to revoking the complete ban, which was in place in the first edition.

It now requires all brand owners and producers to register or renew registration with the concerned State Pollution Control Board (SPCB) or Pollution Control Committee if operational only in one or two states or union territories. They have to do the same with the Central Pollution Control Board (CPCB), if the producers/brand owners are operating in more than two states or union territories. Earlier, only the producers had to register to CPCB or SPCB regardless of their extent of the area of operation.

Solid Waste Management Rules, 2016

Plastic is a big part of solid waste and hence gets coverage in the Solid Waste Rules as well. The rules ask plastic to be segregated as part of dry waste. All manufacturers of disposable products such as plastics packaging (included along with tin, glass) or brand owners who introduce such products in the market have been mandated to provide necessary financial assistance to local authorities for the establishment of waste management system. All brand owners who sell or market their products in packaging material which are non-biodegradable should put in place a system to collect back the packaging waste generated due to their production.

Implementation Status

As per the provision of rules the SPCB or PCC are required to submit the annual report on implementation of these Rules to CPCB by 31st July every year. The Annual Report on the implementation of Plastic Waste Management Rules, 2016 as amended in 2018, for the year 2017-2018 is available on public domain in the CPCB website. Out of 35 SPCBs/ PCCs, only13 provided the information on implementation to the CPCB which was compiled for the annual report²⁹. From the states the information was available following observations were made -

- i. Both SPCBs and PCCs were unable to collect information from all Urban Local Bodies (ULBs) of the State due to reasons unstated.
- ii. Despite the rules, 383 unregistered plastic manufacturing/recycling units are still running in Bihar, Punjab, Manipur, Jammu and Kashmir, Uttar Pradesh, and Uttarakhand.
- Most States have not established an organized system for Plastic Waste Management. According to the rules, Municipal authorities shall be responsible for setting up, operationalization and co- ordination of waste management system.
- iv. Few states like Gujarat, Madhya Pradesh and Meghalaya reported that they are transporting their plastic waste to cement plants for co-processing. Besides, Orissa and Nagaland had reported about using plastic waste for polymer bitumen road construction.
- v. State Level Monitoring Committee has not been set up in most states. Even the States or UTs who have constituted SLMC, are not convening meetings on regular basis, rendering them ineffective.

According to the CPCB Annual Report of 2018 – 2019³⁰, All 35 SPCBs/ PCCs have provided information on the implementation of Plastic Rules and the major highlights are as follows-

- i. Estimated plastic waste generation during the year 2018-2019 is 33,60,043 tons with Maharashtra being the highest generator of plastic.
- ii. Four states namely Arunachal Pradesh, Delhi, Mizoram and West Bengal have not provided any information on the matter of implementation on provisions on plastic carry bags. And eight states namely, Arunachal Pradesh, Bihar, Daman Diu and Dadra Nagar Haveli, Jammu and Kashmir, Kerala, Maharashtra, Manipur and Sikkim did not provide any information on plastic waste utilization.
- iii. It was also observed that SPCBs/ PCCs were unable to collect information from all Urban local bodies of the state with six states/UTs
- iv. There are 1080 unregistered plastic manufacturing/ recycling units running in twelve states namely Assam, Bihar, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Puducherry, Punjab, Tamil Nadu and Uttar Pradesh.
- v. There were no violations on compliance of rules reported by nine States/ UT.

Some of these observations seem quite far form truth. The report says there are only 1080 unregistered units in the whole of country- on ground we see unauthorised plastic units strewn around, even in residential areas in large cities, towns. Also, no violations in 9 states/UTs is hard to believe- even if consider availability of bags less than 50 micron- it is available in every state, which is complete violation. EPR, which is to be implemented, has not started anywhere.

On ground, plastic is still littered and there is hardly any sign of EPR. Plastic waste is still flowing in the informal sector, where is recycled in rudimentary manner. That many states do not take the plastic pollution seriously is evident from the fact that the NGT had to fine 25 states, Rs 1 crore each per month for failing to submit action plans to fight the menace. The NGT in its order, dated March 12, 2019, ordered all states and UTs to submit action plans for implementing PWM 2016 rules by April 30. The green court said that failure to do so would invite a penalty of Rs 1 crore per month. However, except for Andhra Pradesh, West Bengal, Puducherry and Sikkim, 25 states failed to send action plans by the designated date.

5. SINGLE USE PLASTIC Consumer readiness for change

Plastic, a man-made invention has generated significant benefits for society. But in the last two decades, the downside of this useful material has also come in forefront. This is becoming more pronounced now because of the way society has converted the material into a disposable and single-use convenience-practically transforming this human innovation into a mammoth environmental disaster. Not so long ago, single use plastic items were looked upon as great inventions as they were practical, cheap, lightweight, tough and easy to produce. There was no need to wash or store them and you could transport them easily. There seemed to be no drawbacks, no concerns. But now the reality has hit hard and the issue of disposable plastics is in the spotlight. This long-ignored crisis is massive and has caused us to face an unprecedented pollution phenomenon, that continues to put at risk our entire ecosystem and our health. Around the world, one million plastic drinking bottles are purchased every minute, while up to 5 trillion singleuse plastic bags are used worldwide every year.

Source: UNEP

Globally there are now conversations around single use plastics- how to reduce, phase out and manage. Even India joined this conversation recently,

with the Government mulling over banning single use plastic. This has resulted in people becoming aware but the looming question is how much we understand, and if we do understand, are we ready to take the next step and change. Also, what is happening on ground- Is the plastic industry right in saying that all plastic gets recycled. Will the consumers begin seeking out products not packaged in plastics? Will they shun brands that use plastic packaging? Will they demand that their lawmakers impose bans? Through this study, we set out to find answers to some of these questions.

5.1. Single Use Plastics- Ambiguity

As mentioned above, globally now there is effort to phase out/down single use plastics. Though corporations and governments have big role to play, individuals or general public have a crucial final role. Is that consumer aware? We listed a few plastic items, a mix of single use as well as other, for consumers and checked if people were aware of the single use plastics that they were using. What we found in our survey is shocking.

Though there is greater agreement regarding thermocol cups and plates, disposable plastic cutlery and plates being in the SUP category, it was rather surprising to see that most consumers did not consider mineral water bottle or plastic straws as SUPs. The more shocking finding was that only 57% of the respondents thought plastic carry bags were single use plastic!! An over whelming 65% of the total respondents did not categorise plastic balloon sticks and non-refillable pens as SUPs. But surprisingly, most of the survey respondents from the economically lower income group (survey in Hindi), rightly identified these two items as SUPs. This group though got it all wrong for packaging material and mineral water bottles as only 26% and 20% of them believe these are Single Use Plastic. The results clearly point out towards the ambiguity in the mind of individual consumers regarding what is single use plastic. With the focus being brought on single use plastics, experts and activists are asking consumers to shun them. But in absence of clarity, can we expect any behavioural change?

FIGURE 13: Consumer Survey - Identifying SUPs



5.2. Plastic carry bags – still the preferred choice?

Plastic Bags are one of the most abundantly used Single use plastic and its damages very well recognised. Many countries across the globe have banned these non-biodegradable bags. There have been also several bans and restrictions in different measures on plastic bags in India starting 1998. So, it becomes important to understand if the bans and restrictions have brought in change in mindset and behaviour of general public. The survey reveals that though only 14% of the respondents are taking plastic bags from vendors every time they shopped, a sizeable proportion of people are still taking plastic bags on almost regular basis. 69% of the respondents either took plastic bags frequently or occasionally and this is in spite of so much awareness on plastic bags. Though disappointing, since the bag bans and restrictions have been in place for more than a decade, it is heartening to see that 17% of the respondents have chosen the eco-friendly and did not prefer plastic bags at all.

FIGURE 14: Plastic bag usage- still rampant



It is interesting to see the gender specific data in this as the survey threw up some interesting results. The percentage of women who never take plastic bags is slightly higher than men (19% vs 15%), and women seemed more eco conscious as a much smaller percentage of women (9%) compared to men (19%) took these pollutants every time they shopped.

On comparing the English and Hindi consumer surveys in both cases Males use plastic bag



FIGURE 16: Plastic bags from Gender perspective





If we look at the plastic bag usage agewise, the differences are very stark. The youth (aged in the survey as under 20) and the older generation (over 60)seemed to be much more eco conscious as 21% AND 24% respectively stated that they never take plastic bags. Also the percentage of youth which took plastic bags from the vendor everytime they shopped was much lower (10%), compared to the rest of the age groups. Encouraging to see that the youth is more concious and is actually changing its behaviour. The worst culprit is respondents in the age group of 40-60, 25% of them taking plastic bags from vendor everytime they shop. Overall, the oldest group seemed the most eco friendly as a whopping 71% of them never or only occasionaly asked for plastic bags.

ALTERNATIVE TO PLASTIC BAGS

According to the respondents, **Cloth Bag** is the **best alternative**, followed by jute. 46% preferred cloth as an option. However Bio-plastic bags, an emerging alternative, seemed to be gaining popularity as almost 13% of respondents chose that as the best option.

The survey results showed that women respondents prefer cloth bags more than their male counterparts. Age wise, there were some interesting observations, as though cloth bag was the most preferred options for the young, but they were almost equally favourable to Jute, paper and bio plastics. For the age group 20-40 and 40-60, an overwhelming percentage chose cloth as an option and for them paper was not really a very good option. The 60 plus population does not seem to have heard of bio plastics or they don't prefer it, as none of the respondents in this age group chose this option.



FIGURE 18: Alternatives to Plastic bags



FIGURE 19: Preference to plastic bag alternatives- age wise

FIGURE 20: Awareness on plastic bag restriction



AWARENESS

Plastic Bags less than 50 microns have been banned in India since 2016 when the revised Plastic Waste Management Rules were notified. During the survey, we set out to find if the respondents were aware of this restriction. It was good to see that most people are aware, as 61% of the respondents responded affirmatively. Still, even after 3 years of the Rules, 22% were completely unaware. Surprisingly, though the youth were the group which was shunning plastic bags, their awareness of the ban was very low. Only 40% of the respondents, aged under 20, were certain about the 50 micron restrictions in the Plastic Rules. In fact, the awareness grew with age- the 60 plus population was the most aware at 76%!!

But the silver lining was that an overwhelming majority wants a total ban on plastic bags!!!



FIGURE 21: Plastic bag 50 microns restriction - age wise





5.3. E-COMMERCE – Wrapped in waste?

Over the last decade, internet has globally changed the way people buy and sell goods and services. Online retail or e-commerce is also transforming the way India shops and this sector has seen unprecedented growth especially in the last two to three years. India's retail e-Commerce revenues have been estimated to increase from 20.5 billion U.S dollars in 2017 to 62.3 billion U.S dollars by 2023. 83% of our respondents were making online purchases, clearly showing the trend.

As expected, online shopping is more popular in the age group of 20-40 and 40-60, with 87% and 81% respectively adopting this new age shopping medium. But the rapid rise in online shopping is creating mountains of cardboard and packaging waste. Our question to the respondents was whether they felt that these online platforms were using excessive plastic packaging and the majority answered affirmatively. 70% of the respondents across all age groups felt that the packaging was more than required most of the time, only 7% not agreeing with this. We have often heard retailers blaming the consumers for this. But our

FIGURE 23: E- commerce - a popular choice



survey results pointed out that this excessive plastic packaging is not driven the consumer demand. An overwhelming 91% of the respondents said they would choose less plastic packaging, if they were given a choice by the online merchants or platforms. So probably time for the online retailers to go eco-friendly and reduce the unnecessary plastic packaging! More than 90% of the Respondents also felt

FIGURE 24: Age wise online shopping popularity





A need for some framework for E-commerce Retail to reduce plastic packaging.



FIGURE 26: Consumer- not the driving force for online shopping packaging





5.4. Events or Plastic Mounts

Think back to the last event you organised or attended. Now consider the single-use plastic it generated; the tea/coffee/water cups, disposable straws, water bottles, disposable plates and cutlery. If it is a business event, then badges, pens etc. That was just one event. Replicate that thousands of times a day across the city and country; and it becomes apparent – even in absence of official figures – that the events industry has a monumental plastic waste problem. And not just events, there could be some charity food distribution or a small religious function- the mount of single use plastic is huge. Most of us have attended or organised such events. 90% of our respondents said that they had been part of such event where disposable plastic was used.

And many of us don't even know what happens to those plastic mounts. 44% of the respondents admitted that they were unaware of the fate of these discarded SUPs. The awarness among the older generation or 60 plus respondents was very low at 71%. And truly speaking, even the large percentage of people who claimed to know the fate, it is unlikely that they

FIGURE 28: Consumer using SUPs in events



realise the kind of process which the informal sector engages in to collect and recycle those piles of plastic waste.

FIGURE 30: Preference to alternatives to disposable plastic in events



FIGURE 31: Preferred alternatives to SUPs in events- age wise



ALTERNATIVES TO DISPOSABLE CUPS/ PLATES/ CUTLERY

Bio-Plastic and Leaf alternatives come to the forefront as the preferred alternative to disposable food ware in events. Leaf plates (32%) represent the want for natural alternatives or traditional means whereas Bio-plastic (33%) represents the faith in new technology for better alternatives. Paper was not considered as a choice by any of the respondents- as they felt this was not suitable for these events. Steel was also a popular choice as 25% respondents chose this material as an alternative, but glass was only a preferred choice of 7% of the respondents. But it is certainly a big positive to see people across gender and age groups ready to move on to alternatives. It is probably time for the government to support the alternative industry and help them grow and meet the demands, as some of alternatives are still at small scales.

BAN ON DISPOSABLE CUPS/ PLATES/ CUTLERY

The alternative industry can really get a big push with a restriction on plastic industry and the common public seems to think that there should be **ban** on disposable Cups/ Plates/ Cutlery. A national level ban might be ambitious at this stage but cities can learn from Lithuania's capital Vilnius. If you want to enjoy a city event in Vilnius, you need to take your own keep cup, fork and plate along! In a unanimous decision, Vilnius City Council has banned the use of disposable plastic utensils in city events as of March 2020.

FIGURE 32: Consumer choice to ban SUPs in events



5.5. Cut the Cutlery

E-commerce food delivery platforms have really changed the way urban middle-class India eats. According to the National Restaurant Association of India (NRAI), Delhi's foodservice market is estimated to be worth Rupees 31132 crores

FIGURE 33: Food delivery - popular choice



and home makes 25% of the market. The ease of ordering food online, quick delivery and a wide variety of cuisines to suit every pocket and taste, have all made these platforms highly popular, not just with the young generation, but even the elderly! 73% of our respondents order food online and this is across almost all age groups.

Given the rising popularity of these platforms, the mountain of plastic debris generated by them is also set to rise, unless the food aggregators, food companies and consumers take action. On a positive note, the consumers seem to be willing to make a change. Often cutlery accompanying the food delivery is unnecessary, as customers get it delivered at home or offices where they have access to cutlery. That is probably the reason why **86%of the respondents said that they would choose to not take plastic cutlery with food ordered online, if given a choice.** This clearly shows that the food aggregators should give a choice to the customers regarding need for plastic cutlery.



FIGURE 34: Food delivery - Is age a factor



In recent times, many food delivery giants do give a choice. But there are two problems- first, the choice option is not very prominent and most consumers miss it and second, choices do not get registered and cutlery still comes along with the food.

ALTERNATIVE - PLASTIC CUTLERY

Some states in India have banned single use plastic, including plastic cutlery from food delivery. But its implementation remains poor, as the industry seems to suggest that there are no alternatives. But consumers seem to differ. Bio plastic emerged as the most preferred option as 38% of the respondents preferred that. Wooden cutlery also emerged as an option among the respondents. But most reassuring was the response from 36% of the respondents who felt that there was no need for the cutlery, which means that we don't just reduce plastic waste but also other resources. Women respondents seem to be more eco-friendly as 40% of them, compare to 32% of men chose 'no cutlery' option.



FIGURE 36: SUPs in food delivery- alternatives

Bio plastics seem to be least preferred option for the elderly (60 plus) as only 18% of them chose that...or may be not many of them have not heard yet about the material.

TABLE 9: Preference for alternatives to plastic in food delivery- age wise

Age Group	Paper cutlery	Bio-plastic cutlery	No need for cutlery	Others
Under 20	21%	31%	45%	3%
20-40	21%	41%	33%	5%
40-60	19%	30%	46%	5%
60 plus	35%	18%	47%	0%

BAN – PLASTIC CUTLERY

Recognising the impact of single use plastic waste from this segment, the respondents felt that a ban is necessary to bring about a change. 78% of the surveyed public are in favour of an outright ban on the use of disposable plastic cutlery in food delivery. The demand for the ban grew with age!! 94% of the respondents in the age group of 60 plus were in favour of the total restriction, compared to 89 in 40-60, 75% in 20-40 and 72% in under 20 age group.

5.6. Stirring Up Plastic Storm

FIGURE 38: Plastic straw/stirrers continues to be in use



Plastic straws are almost always used only once before being disposed of. Further, they really are non-essential as one

are non-essential as one can drink directly from the glass or from the bottles. Same is the case for stirrers- often they are unnecessary. But they still continued to be used in large number across the globe. But there is probably a change already happening in this segment, owing to growing concern on this. A large majority of our respondents do not use plastic straws, a positive trend. Among the age groups, 60 plus was the least offender, in terms of generating plastic straw waste, as 71% did not use one.

But the consumers were happy to shun the straws, as was evident from the survey results.87% of our respondents said that they would choose not to take a straw if they were given a choice. Clearly means that this usage

is unnecessary and the food outlets can eliminate this usage and may not really have a look for an alternative in all cases.



FIGURE 39: Plastic straw usage age wise

ALTERNATIVE – PLASTIC STRAW

Still looking at alternatives is important, as there could be cases where it is absolutely necessary for hygiene and medical reasons. Though as an alternative, no straw seemed to be the overwhelming majority response, paper and metal straws have also caught on and some consumers chose these as an option. Bamboo straws, though now available in the Indian market, was a choice for very few (as part of others).



FIGURE 37: Plastic cutlery from food delivery-ban needed?



FIGURE 41: Consumers' choice for plastic straw alternative

Alternative to Plastic Straws



It is clear that the consumers do not want plastic straws and would prefer to eliminate it. The demand for a ban on plastic straw further accentuated this. 91% of the respondents said that there should be a ban on plastic straws-making it clear that straw should be first on the list of bans in the Government's mind.





5.7. Plastic Pollution – People's Take On It

Though the environmentalist and research across the globe and closer home have been talking about plastic pollution for many years now, the focus on single use plastic is a recent phenomenon. Only after Prime Minister Narendra Modi's Independence Day address to the nation, where he referred to the environmental harm caused by single-use plastic, that general public suddenly took notice of SUPs issue. Since then, there has been lot of focus on the issue by the mainstream media, social media and of course some amount of government campaigns as well. A large majority of our respondents were also aware of the impact of single use plastic on the environment. Most of them seemed also aware of the impact of SUPs on Marine pollution. FIGURE 43: Single use plastics- awareness of its impact



In both the cases, the females seem to be more aware of the issues surrounding Single use plastics.

PLASTIC AND CHEMICALS: TOXICS IN, TOXICS OUT

Consider what you've eaten today. For breakfast, perhaps you drank juice from a plastic bottle. In lunch, you might have had yogurt from a plastic cup. If you ordered lunch, the healthy salad may have been packed in a plastic container. There's a good chance much of what you ingested was packaged, stored, heated, lined, or served in plastic. And unfortunately, there's mounting scientific evidence that these plastics are harming our health, from as early as our time in our mother's womb. Most of our food containers — from bottles to the linings in aluminum cans to plastic wraps— are made using polycarbonate plastics, some of which have bioactive chemicals, like bisphenol A (BPA) and phthalates. There is mounting evidence that these man-made chemicals can leach from the containers or wrappings into the food and drinks they're holding —





especially when they're heated. And surprisingly, people seem to be aware of this risk. 85% of our respondents said that they knew that plastic was leaching chemicals in our food.



FIGURE 45: Awareness regarding chemical leaching from plastic

Microplastic, which is relatively a very new issue in India, has been lately covered a lot by popular media, especially studies finding microplastic in water, cosmetics and salt. This is probably the reason why 78% of our respondents were aware of the issue. But surprisingly, a smaller percentage of respondents were aware of the Plastic Waste Management Rules. This points out at the need for the regulatory agencies to reach out to the public and educate them about the Rules.

PLASTIC WASTE MANAGEMENT RULES, 2016 AS AMENDED IN 2018

Though overall the awareness levels of consumers on health and enviornmental impact of Plastic seems high, it is many a times not resulting in a change of behaviour, as evident from the sections above. Plastic bags are still in use, people continue to use straws, disposable cutlery. But on a postive, majority of consumers want a change and are willing to change their practices and eliminate SUPs to a large extent. This is probably an indication that different agencies, including Government, Civil society organisations, Industry and media need to make efforts and design programmes and initiatives which will focus on behaviour change.

FIGURE 46: General Public still unaware of the Plastic Rules





6. INFORMAL SECTOR- ROLE IN Suparation of the sector of th

In India, like most other developing countries most waste streams, including plastics, are being managed by the informal sector or unorganised sector. It has been estimated that there are 1.5- 4 million waste pickers in India, who pick up, clean, sort and recyclable waste and sell it further up the value chain³¹. The International Labour Organisation (ILO) defines informal sector waste workers as individuals or small and micro-enterprises involved in the process of managing waste without being registered and without being formally charged with providing waste management services. These unregistered groups have been managing waste across the country, especially in the urban areas, where waste generation is huge but there is no adequate system in place.

Informal sector has enormous potential in becoming a sustainable solution to waste management in the country, as they have a pool of information on the current narratives as well as the required skill sets. Since they are handling an enormous quantity of plastic waste, collecting information about the same from them will give us a complete picture about current practices, economics and plastic items which are being recycled or being dumped.

This section talks about the current scenario of plastic waste management. The field study conducted to assess this was limited to Delhi, which is the biggest informal hub in the country for plastic recycling. Despite being the national capital, Delhi has earned the infamous tag of being one of the most polluted cities in the world. Plastic waste management is one of the many environmental challenges the city grapples with. The operations in Delhi are spread; and are a mix of small to large units. The list of areas where the survey was conducted and areas identified for informal Plastic Waste Collection, sorting and processing are as follows -

- Madanpur Khadar
- Geetanjali Enclave
- Ghazipur
- Nangloi
- Nihal Vihar
- Paschim Vihar
- Sarita Vihar
- Tamur Nagar
- Tikri
- Udyog Nagar

6.1. Single Use Plastic: Recycled or littered?

Over the last decade, single use plastic has become the biggest user of low value plastics, especially from packaging, and food and goods online delivery systems. Though the profit from SUPs is going to the industry, the burden of managing this waste has been shifted onto tax payers. Policies aimed at regulating single use plastics have faced stiff opposition from the industry which has historically linked the plastic problem to poor waste management and the bad littering habit of consumers. In the scenario, where the industry has to a large extent refused to own up the responsibility and the municipalities have failed to manage this growing waste stream, informal sector in a way has been the only saviour, keeping a lot of this waste from being landfilled or ending up in ocean. But even they don't pick up all the SUPs, mainly because of monetary reasons, or sometimes also for practical difficulties.

The informal sector players included in this study could be categorised as below-

- Level 0 Collectors: Consist of waste pickers or ragpickers who collect plastic waste material from dustbins or landfills and have no input cost. They have no shop/storage space of their own.
- Level 1 aggregators or Segregators: They are small scrap aggregators who own a shop where they collect, store and minimally process waste material collected from L0 and times directly from households, apartments and small businesses. They at times sort plastic waste into different categories to attract better price.
- Level 2 dealer or traders: they primarily buy plastic material from L1 aggregators and bulk generators of waste. To be viable, they have to be able to store and process much larger volumes of recyclables. Greater specialisation with regards to the material is typically found at this level, in terms of segregation and/or processing.

From the list of SUPs we had shortlisted, the informal plastic waste handlers pointed out the ones they deal with. Since their operations are low or no cost ones, they are able to extract profit from many SUPs which otherwise may have been financially unviable to recycle. Still though they picked up most of the material, there is three distinct category that they did not collect- Small FMCG plastic pouches, noodle packets and multi-layered packaging for biscuits, chips etc. And it is easy to comprehend that since these are popular products, across age and economic groups, the amount of discarded plastic from these will be also enormous.







FIGURE 49: The types of SUPs dealt with in informal sector in Delhi



Among the units visited/handlers spoken to during the field survey, Plastic boxes used in packaging, Personal care product packaging (shampoo, body wash etc. bottles), Pens, PET bottles seem to be dealt with a larger number of units. Very few units were handling medicine wrappers, Low Grade PP Products (biscuit Trays, some Packaging etc.), and cream tube. Surprisingly, plastic bag of all qualities (>50 and <50 microns) was picked up and sold ahead, though not many units were ready to trade in it. The quantity of these SUPs handled in these units varied.

Each of these types of SUPs was studied further to understand its handling in the informal sector, amounts handled and the economic gains made.

6.1.1. PLASTIC IN DEMAND

The on-field interaction made it clear that some single use plastic materials were handled by almost all players as it had good recycling value and greater demand in the market. The waste collectors or ragpickers picked up these plastic items and sold them either as mixed or segregated. These items have been detailed below.

PET Bottle

Polyethylene terephthalate (PET) is one of the most widely used plastics. One has to just look around to spot a PET bottle – either containing mineral water or soft drink or other liquid items. PET bottles, post use, still carry a lot of value, and recycled PET can be used in a wide variety of applications. This makes post-consumer PET bottles a very



sought-after item by waste collectors. These bottles are bought by waste dealer, who employ people to segregate, sort and further sell it to large vendors or recyclers. The caps, neck rings, labels (non-PET components) are removed, and the bottles are shredded, washed, and sold as what is called 'washed flakes'. These washed flakes are predominantly used to make polyester fibre, which is used as filling material for cushions, pillows, and converted to fabrics for use in clothing, upholstery, etc. The PET recycling business has been estimated to be around Rs 3,000- 4,000 crores in a given year in India³².

As can be seen from the survey results, almost all waste pickers were collecting discarded PET Bottles. Since they are already collected as separate stream (because of huge demand), the units involved in segregation were fewer. But the numbers went up again for dealers, many of them dealing with only PET bottles, who were getting the bottles sorted in their own units. Discarded PET bottles fetch waste collectors Rs. 14-15/kg, whereas segregated bottles fetched much higher cost at Rs. 20/ kg. The volumes handled by the dealers were also much higher.



PET Bottles	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	70	1350	3000
Price (in rupees) per kg	15	20	22.5

Plastic Packaging Boxes

Plastic Boxes, widely used for food delivery as well as food packaging, are being readily recycled in the plastic informal sector. As compared to PET, the price is lower, at 10 rupees per kg, but still attracts the waste pickers as multiple waste segregators and dealers are ready to buy the material. Amongst the waste collector, all the respondents picked up this plastic type. However, according to some of the handlers in the field, there are different categories in packaging boxes made of plastic- usually identified by colour white, transparent and black. The white and transparent category are recyclable and get picked up, however the **BLACK CATEGORY** is of a lower grade and therefore **NOT RECYCLABLE/DIFFICULT TO RECYCLE** and is discarded to end up in a landfill.

At the segregation and trading points, the volumes handled are substantial.



FIGURE 50: Percentage of informal players handling plastic packaging boxes



Ghazipur Landfill: Being Infamous also makes it famous

The landfill was opened in 1984 and reached its capacity in 2002 when it should have been closed. But the city's debris continued to be dumped here - hundreds of trucks arriving each day. The country's tallest mountain of waste collapsed couple of years back killing two people and bringing it under radar. Garbage dumping in Ghazipur was banned after the accident happened and in 2019, the Prime Minister's Office (PMO) stepped in and sought help from global experts to grapple with the challenge

While Bhalaswa Landfill and Okhla Landfill continue with their business as usual, the plastic waste segregators in Ghazipur have been impacted by this. There is constant scrutiny of officials and their entry to the Ghazipur landfill has been banned. Raids, as they call it, are conducted at night, where they are often attacked by animals and are at a risk of injury from sharp object lying with waste. As the officials frequent the Ghazipur site more often now, if spotted by them hefty challans are imposed.

hough it is important to keep ragpickers out of this mountain of waste, lack of vaste picking means that the plastic waste pile, which may have been otherwise bicked up, now will keep on rising higher.

TABLE 10: Quantity and Price of plastic packaging boxes in informal sector

Plastic Packaging Boxes	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	50	2000	3050
Price (in Rs) per kg	9	15	17

Personal Care Product Packaging

Bottles and Tubes

The personal care industry generates a lot of plastic waste. Shampoo, lotion, deodorant: they all come swathed in plastic bottles and creams, facewashes etc are filled in tubes for convenience. Plastics can be moulded into packaging that is light, flexible, and sturdy and that's why has become the most convenient choice. The beauty and personal care product market has grown tremendously since 90s and continues to see upward trend- resulting in a lot of waste from the bottles used to dispense these products. PCPP – bottle, usually made of High-density polyethylene (HDPE), seems to be a popular choice among the informal players, especially among the waste pickers or collectors- all respondents in this category were picking up this valuable stream. A large number of segregators and dealers also dealt with the plastic bottles. Though the price is significant, the quantum being dealt with is not. This can be owing to the fact that these bottles usually last long and hence are disposed off in smaller numbers.



FIGURE 51: Percentage of informal players handling PCPP- bottles

But for tubes, the scenario is a little different. Only around **16%** of the stakeholders are dealing with the material- lower for the waste collectors at 11%. Even amongst those who are picking up these, they often separate the nozzle and cap from the tube and then sell that further, the tube is often rendered useless- adding to the landfill load. But the quantity of the tubes dealt with is huge and the price of the cap or nozzle is also higher than the bottles.

FIGURE 52: Percentage of informal players handling PCPP- tubes





TABLE II: Quantity and Price of PCPP bottles in informal sector

PCPP Bottles	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	15	500	4000
Price (in rupees) per kg	10	15	16.5

Another important thing to note is that many collectors and segregators deal with mixed quality tubes- some of full plastic and some multi-layered. The multi-layered ones are not sought after and sells at one rupee per kg- not for the tube part, but for the cap which is made of PP.

TABLE 12: Quantity and Price of PCPP tubes in informal sector

PCPP Tubes	Collectors	Segregators	Dealers
Quantity (in kg) per month	Quantities not divulged	1000	1500
Price (in rupees) per kg	10	20	21

Pens

The concept of a disposable pen is relatively recent. Earlier the norm was to use fountain pens, dipped in ink, which slowly got replaced by refilable pens. These pens were never meant to be thrown away and could be used for longer periods- at times for lifetimes. Because disposable pens are so affordable and losing them doesn't prove to be much of an issue, they gained popularity. The disposable plastic pens are now everywhere- at home, at workplaces, and at schools and are discarded in large numbers. Yet, there is very little awareness of the pollution caused by this small single use plastic item. According to the estimates, school students in Kerala alone throw away more than one and a half crore pens in a month. In Kerala in a drive in 2017 called 'Pen Drive', 7 lakhs plastic pens were collected³³!

FIGURE 53: Percentage of informal players handling plastic pens



TABLE 13: Quantity and Price of Disposable plastic pens in informal sector

Plastic Pens	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	50	30-500	2800
Price (in rupees) per kg	10	11.5	13

Three kinds of plastics are usually used in Use and Throw Pens. The Pen Cap is made up of HIPS, Pen Body is made up of PS, the Body top and bottom cap is made up of polyolefins. All these plastics are recyclable; hence this category of SUP is a sought after in the informal sector. Not very large quantities are collected by individual waste pickers but since it is picked up by all the pickers, the volumes increase as we go higher up in the value chain- with individual dealers handling close to 500 kg per month.

Not very large quantities are collected by individual waste pickers but since it is picked up by all the pickers, the volumes increase as we go higher up in the value chain- with individual dealers handling close to 500 kgs per month. **PICTURE 6:** Single use Plastic Pens (Source: Google)



Disposable Plastic Table ware

Plastic table ware, plastic plates, spoons and forks, has become staple amongst both the fast food industry and in everyday life, due to its ease of use and accessibility. For street side food vendors also, these have become the preferable choice as it saves them a lot of time otherwise spent cleaning plates, allowing them to serve more customers especially during peak hours. Online food delivery and increase in dining out has certainly augmented its use. The traditional used steel got replaced over time because of hygiene issues as well as high cost. Plastic cutlery is designed for 'use and throw' and hence lands up in large quantities in waste piles. Due to the fact that plastic tableware is so easy to use and dispose, the environmental impacts of its disposal has been rarely thought about.



Plastic Cutlery

Plastic spoons or forks etc. are typically made of either polypropylene or polystyrene and can be of different qualitylight, medium or heavy weight. Polypropylene and Polystyrene are recyclable, hence are sought after material in the informal sector. But they are light weighed and hence weight wise quantities are not too huge. The important thing to note is that lower grade quality plastic cutlery is often not picked as they fetch little value or if they are mixed, then get segregated and discarded at the segregator level.

TABLE 14: Quantity and Price of Plastic Cutlery in informal sector

Plastic cutlery	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/ person	5	9	7
Price (in rupees) per kg	5-18	5.5-19	6-20

Plastic Cups and Plates

Non-foamed polystyrene is also used for disposable plates and cups. Polyethylene and other plastics are also used, depending on the quality and requirement. Since polystyrene is easily recycled, it gets picked up by waste collectors, even though many a times they come soiled because of food leftovers. Usually they are not segregated at the collection level and go in the mixed bag of plastic with other products.



FIGURE 55: Percentage of Informal Players handling DCP

TABLE 15: Quantity and Price of Plastic Plates/Cups in informal sector

Plastic Plates/Cups	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	39.15	312.5	1000
Price (in rupees) per kg	6.5	11.5	Not disclosed

However there are low grade polypropylene disposable cups and plates which are not recycled.



PICTURE 7: Plastic strewn around- no takers

Straws/ Stirrers

The small, seemingly harmless tableware that goes generally unnoticed in our everyday life, is now part of the 'most hated' plastic lists. It is certainly not a surprise to see the kind of backlash straws are getting as plastic straws made the 'top ten' items picked up on beach clean ups. Avid scuba diver Kasey Turner was snorkelling at a popular dive site in Manly, Australia and found 319 straws on a single 20-minute snorkel. 24 hours later Kasey went back and did another and found 294 in the exact same place³⁴! It is one of most used single use plastic items and probably used for the lowest time period. Not only restaurants, but roadside juice shops, coconut water vendors- one can find straws used everywhere – and also disposed off everywhere.

Most single-use plastic straws are made from polypropylene, a recyclable material. But many waste collectors on ground shared the difficulty in collecting this from waste dumps. Its small, lightweight structure makes it difficult to segregate. It is only dealt with when found in bulk.

FIGURE 56: Percentage of informal players handling plastic straws



Though the material may look flimsy, but straws also fetch a good price, equivalent to plastic boxes or other tableware.

TABLE IG: Quantity and price of Plastic straws in informal sector

Plastic Straws	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	Part of mixed bag	20	Not Disclosed
Price (in rupees) per kg	10	16.5	Not Disclosed

6.1.2. PLASTIC IN DEMAND BUT NOT TOO POPULAR

These single use items were picked up but were not were popular with waste pickers and other stakeholders on ground, for varied reasons.

Styrofoam Products

Polystyrene is one of the most widely used plastics. It comes in two main forms – expanded and solid. Expanded polystyrene is commonly called Styrofoam, and is used to make things like disposable cups, plates and packing fillers etc. It is a light-weight material, about 95% air with very good insulation properties. Because of the amount of air in its structure, Styrofoam is considered to be unsinkable and capable of maintaining its form- the reason why it is widely used.

Styrofoam is recyclable and hence get collected and processed. Almost 50% of the waste pickers were dealing with this polystyrene form, but since it is a very different form of plastic, it usually already segregated during pick up and hence we found very few Waste segregators dealing with. Though only one third of dealers were trading in Styrofoam (widely known as Thermocol in the field), they were usually dealing with only this plastic form. However, the quantum is not very high as Styrofoam products, because of the air trapped, is light but occupy a lot of space. The huge volume makes it difficult to transport and making transportation expensive if done properly– probably the reason why formal recycling of these products does not reap any benefits.

PICTURE 8: Styrofoam piles in the informal sector in Delhi



FIGURE 57: Percentage of informal players handling Styrofoam



TABLE 17: Quantity and Price of Styrofoam in informal sector

Styrofoam	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	22.5	1500	300
Price (in rupees) per kg	20	25	25

Most segregators were selling it directly to the recyclers and hence there was no price difference for segregators and dealers. Also, the volumes handled by segregators were much higher compared to dealers.

Bags

Polythene bags are considered to be one of most visible plastic pollution products. The concerns related to its littering, choking drainage systems and being found in stomachs of animals are well known and probably were reasons why the thinner (<50 micron) bags were banned in the Plastic Rules. In spite of the ban, these thin bags continued to be in use, vendors giving it out and consumer asking for it and sometimes accepting it as default. The same is with the thicker bags. Though many states across India have banned plastic bag completely, irrespective of thickness- its implementation on ground is dismal everywhere, except couple of states like Sikkim and Himachal Pradesh. Since the bags continued to be used in large quantities, large quantities also join the waste streams. But the thinner bags have lesser takers, as is evident from our survey of the informal sector. Though around 85% of the waste collectors were dealing with >50 micron bags, only 52% were dealing with <50 micron type. This is probably because of the soiled nature of the discarded bags as often they contain rotting food items or are not in a condition to be cleanly picked up, especially the thinner ones. Among the segregators and dealers, there seem to be no such preference and they deal with this SUPs irrespective of quality.



FIGURE 58: Percentage of Informal players handling polythene bags

TABLE 18: Quantity and Price of Polythene bags in informal sector

	Plastic Bags	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	>50 micron	62.5	325	1000
	<50 micron	75	312.5	1000
Price (in rupees) per kg	>50 micron	3.25	3.5	Not disclosed
	<50 micron	2	4	Not disclosed

Pricewise, as expected the thicker bags command a better price in the market, though the difference is not too big. Surprisingly, in spite of the ban, the quantity of thinner bags being handled in the informal sector is more, compare to the thicker one which are legally allowed. Lower cost of the <50 micron bags could be the reason for its wider usage and discard.

Balloon Sticks

No birthdays, especially kids, are complete without balloons. Balloons have been identified as among the top three most harmful pollutants threatening marine wildlife, along with plastic bags and bottles. Balloons are not collected as they are in tiny shreds or pieces when discarded and hence adds to the landfill load directly. But there is another part of it which has some recycling value-balloon sticks. Earlier balloons were simply tied on threads, but now they mostly come with plastic sticks.

Collectors picked these up as part of mixed plastic waste and sold it further. And hence a large percentage of them were dealing with them. But at the segregator and dealer level, these numbers went down, as not many of them found it a profitable material.



FIGURE 59: Percentage of informal players handling plastic balloon sticks

Since it was part of mixed plastic bag, the units or workers on ground were unable to estimate quantities handled. But the prices per kg were good and yielded good profit for the dealers.

TABLE 19: Quantity and price of plastic balloon sticks in informal sector

Balloon Sticks	Collectors	Segregators	Dealers
Price (in rupees) per kg	10	10	15

Milk Packets

Milk in India is processed and marketed by 170 milk producers' co-operative unions and 15 state cooperative milk marketing federations. The plastic pouches used for milk sale forms one-third of the garbage collection³⁵. Milk packets are made of low-density polyethylene (LDPE), which has good recycling value. Despite having a high-recyclable value, dairy companies do not have any proper mechanism to deal with these pouches hence they are left at the helm of rag pickers only. Only the packets collected by rag pickers get recycled while the rest of them end up clogging drains and littered around. Earlier these Dairy packets are typically snipped off from one corner. Those small pieces are never picked up and get mixed with other garbage to end up in landfill. Though it is a small piece, considering the millions of packets used daily across India, the amount will be huge.

FIGURE 60: Percentage of informal players handling dairy packets



packets had a higher market value owing to their thickness and were collected separately; however now they sold with a mix bag of plastic. On being asked about the reason for this change many blamed the colourful printing on all milk packets, which makes them difficult to recycle. Still a large percentage of ragpickers were collecting the dairy packets and selling it ahead.

TABLE 20: Quantity and Price of Dairy packets in informal sector

Milk Packets	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	75	350	Not disclosed
Price (in rupees) per kg	3	6.75	Not disclosed

Plastic Wrappers and packets

Packaging, as stated in the earlier chapters, is one of the largest segments of single use plastic. With the growth in online shopping, this waste is set to balloon in coming times. But currently not many players are dealing with it. Only 21% of the waste collectors sought this material and though the percentage of segregators dealing with this was higher- the small percentage of dealers pointed towards a very specialised group involved in this. The reason for this could be overall smaller quantities. Compared to the boxes, the amount of plastic wrapper and packets waste was one third. Pricing wise though, it fetched the same amount.



FIGURE 61: Percentage of informal players dealing with packaging wrapper and packets

TABLE 21: Quantity and Price of plastic wrapper and packet in informal sector

Plastic wrappers/packets	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	50	52.5	Not disclosed
Price (in rupees) per kg	9	10	13

Plastic Medicines Wrappers

Blister packs are often used for medicines in the pharmaceutical industry. These consist of the so-called push-through Blister, a moulded plastic with cavities for the individual tablets, and a push-through closure made of aluminium foil, which is called blister film or lid film. Blister packaging is comprised of PET (polyethylene terephthalate) or PVC (polyvinyl chloride) plastic packaging. The problem with composite waste materials is that they are more difficult and costly to recycle compared to homogeneous materials, because you need to separate the different materials. Additionally plastic-aluminium composites only form a relatively small-volume waste stream, which makes it difficult to make the recycling process economical.

With overall only **11.8%** penetrations, these are hardly picked or traded. According to the workers interviewed in the field, only the total aluminium blister packs were recycled, the plastic ones were mostly left off and go to landfill.



FIGURE 62 : Pecentage of informal players handling plastic medicine wrappers

Polypropylene Products

Commonly called **FARRA, this** has been recognised as one of the **MOST PROBLEMATIC SINGLE USE PLASTIC.** PP is one of the least recycled post-consumer plastics and because of the short lifespan of PP made packaging, the majority of it ends up in landfills as waste. We only found one waste collector who picked it and few segregators who were separating it.



PICTURE 9: Farra, multi-layered tubes- no takers

TABLE 22: Quantity and price of polypropylene products

PP Products	Collectors	Segregators	Dealers
Quantity (in kg) per month per unit/person	10	1000	NA
Price (in rupees) per kg	3	Not disclosed	NA

6.1.3. WASTED- NO TAKERS

The above sections mentioned some of the single use plastics which have some value, but the study found three popular categories, used and discarded in large volumes, which have close to no recycling value- especially in the condition that they are discarded- and hence get thrown around, reaching our water bodies and landfills, breaking it down over time to micro factions and taking a more destructive form in MICROPLASTIC. **Multi-layered packaging, small plastic pouches used by many industries (FMCG, PCPP, Pharma etc.) and some FMCG packaging of noodles etc**. These stay in the environment because rag-pickers do not pick it up and the producers have not made any plans under extended producer responsibility (EPR) to retrieve it from the consumers or from open/ dumpsites.

Multi-layered packaging comprises a thin foil of aluminium, which is sandwiched, or laminated in a matrix of paper and/or plastic layers. Most companies prefer multi layered packaging because it is light, reduces shipping volume, doesn't take up much space on a shelf, and is graphics friendly. So, whether its wafers, biscuits, candies, namkeens, fruit juice cartons, chocolates or personal care products like toothpaste, shaving tubes- all are multi- layered. According to a study done by The Energy & Resources Institute (TERI), the total consumption of just disposable, multi-layered fruit juice cartons is at about 900 crore a year, of which only 270 crore (30 per cent) get recycled, leaving the remaining 630 crore packets (equal to 94,500 tonnes @15 g/pack) as garbage. So, one can imagine the amount of waste which is generated from this multi layered packaging- a waste which is discarded and dumped.

Similarly, small pouches- of shampoos, shaving creams, ketchups, achaars and many others-have no takers. Some of these pouches are used extensively in rural areas as well, due to low cost- in areas where there are no waste management systems, no landfills- meaning all of these end up in not just city landfills but also near our agricultural areas. Packets of noodles also had no takers on ground because of the quality of plastic used.

These are the non-recyclables from the SUPs looked at during this study. But there are host of other single use plastic products- like cotton buds, cling films, cigarette butts, plastic cards (like credit card) etc., which also may not have any takers or very few takers. So, what are they doing to our environment- our soil, water bodies, air- marine animals, wild life- and finally US...time to ponder! **By 2050, the amount of plastic in seas and oceans across the world will weigh more than the fishes, says a headline-grabbing estimate by the Ellen MacArthur Foundation.**

In some formal spaces, where these non-recyclables are segregated, these are sent for co-processing in cements kilns. But those quantities are very less. Most of this reaches the informal sector- from where it is either dumped in landfills or just lie around to be disintegrated or sometimes burnt for fuel or heat.

6.1.4. BUSINESS AS USUAL FOR RECYCLABLE SUPs?

The first two sections in this chapter detailed out the SUPs which have recycling value and hence do get picked up by the informal sector and gets processed. Some of the products like PET or plastic packaging boxes or PCCP bottles are much in demand in the unorganised sector but many of the others have little or no value and hence very few takers. The plastic industry often takes this recycling by informal sector as an excuse to keep on bombarding the planet with more of this non- biodegradable material. 'Plastic is recyclable'. But the question is 'at what cost'?

While it is true that India recycles much more than the industrialised countries through an informal network of waste collectors and segregators, a study by FICCI points out that the fast-growing consumption has brought us to a point where consumption has clearly outstripped

India's biggest online delivery start-ups Swiggy and Zomato are each reportedly delivering about 28 million orders a month. Zomato CEO Deepinder Goyal, in a September 2018 blog, estimated that orders through food delivery aggregators was adding up to "22,000 tonnes of plastic waste created every month in India". India's current capacity to recycle plastics. Moreover, unlike glass and aluminium, plastic isn't processed into the same item it was, when it was collected- especially in the conditions in which it is recycled in India. The quality of plastic is downgraded every time it is recycled, so eventually and inevitably all plastic will end up in a landfill.

Recycled plastics, though promoted as eco-friendly material, is increasingly being recognized as posing threats to our health and environment. Plastics contain additives that defines its properties, including stability, colour, and flexibility. Most of the thousands of these chemicals aren't regulated, but it's clear that some of those additives, which end up in recycled plastics, are dangerous. Toxics Link's earlier studies on WEEE plastic found that many of the recycled plastics contained heavy metals and brominated flame retardant associated with neurological, reproductive, and developmental harms.

Though informal sector recycles a large amount of plastics and keeps it out of landfill, it is also important to consider the condition in which these processes happen. Though this study did not look at the recycling or pellet making units (refer to our reports on plastic for this), the conditions in which plastic was collected and segregated was repugnant. The working conditions are unhygienic and hazardous- there no safety and health protocols being followed. Children and women are employed in large numbers, at collection and sorting facilities. **Is this how we want our waste to be recycled- sorry DOWNCYCLED?**



7. INITIATIVES AND BEST PRACTICES AND VOLUNTARY EFFORTS TAKEN ACROSS THE WORLD

When in 2019, world's first zero waste flight took off, Australia's national airline Qantas became a part of history by doing this. They used bio degradable napkins, cutlery, and cup and food containers³⁶. It was also made sure that the waste does not end up in landfill and was composted or sent for recycling. This represents the spirit that should be inherited by industrial giants who play a vital role in contributing to waste generation, primarily plastic waste. Following its steps many commercial flights, including a couple of them in India like Vistara and Air India have banned a few single use plastic items on board. In India, After the August 15 announcement, various public and private organisations and state and Central government departments initiated moves to ban single-use plastics.

One of the biggest commitments to reduce plastic packaging waste, the largest single use plastic category, has come from the Nestle group. They announced an investment of 2 million CHF to work towards sustainability. This step was to lead the shift from virgin plastics to food-grade recycled plastics, and to accelerate the development of innovative packaging solutions. In a step towards that, they have opened an Institute of Packaging Sciences in 2019 in Lausanne, Switzerland to accelerate their efforts to bring functional, safe and environmentally friendly packaging solutions to the market and to address the global challenge of plastic packaging waste.³⁷In words of Nestlé CEO Mark Schneider: "Our vision is a world in which none of our packaging ends up in landfill or as litter." In addition to the work of the Institute, they are also working with value chain partners, industry associations and the civil society to explore different packaging concepts to shape a waste-free future.

Another big global brand, Unilever also claims to have reduced its total waste footprint per consumer use by 31%since 2010. They have worked in areas where they have direct control such as reducing waste in their own operations with the help of light weight products and alternative packaging design. For example, in 2018 they claim to have removed over 1,100 tonnes of plastic from skin care product packaging across Vaseline, Dove, Pond's and Simple brands, among others.³⁸

The Hospitality industry is one of the biggest culprits as it uses a lot of single use plastics. But the industry has also been making efforts to reduce this. Internationally, groups like Hyatt, Marriott and InterContinental Groups have replaced individual bottles of shampoo, conditioner, shower gel, and lotion with large-format bathroom amenities. There is also a move to eliminate plastic straws and reduce plastic water bottles the international chains. India's hotels have also jumped on to the bandwagon. Taj Hotels, for example, claims its hotel in Havelock Island in the Andamans, opened in 2018, is the first zero one-time use plastic hotel. The group has pledged to phase out single-use plastic from all its properties. Taj group hotels, including its flight catering wing TajSATS, say they have eliminated 20 lakh plastic straws in 2019³⁹. ITC, another prestigious hospitality group in India that owns a large number of properties, had pledged to discontinue single-use plastic in all its hotels, from December 31, 2019. Many hotels chains nationally have taken some measures, though most times it is limited to replacing plastic straws with paper or bamboo ones, and replacing plastic drinking bottles with water in glass bottles. Some hotels have also replaced the miniature personal care bottles with permanent dispensers. But there is a lot to be done as this industry has various other single use plastic usages. And also, smaller facilities or groups have still not made the shift.

In the food business, in 2018, McDonald global announced that by 2025 all of its packaging will be made from recycled, renewable or certified sources with the preference being Forest Stewardship Council (FSC) certified while also aiming to recycle 100% of restaurant packaging. They have stopped using lids and straws for dine-in soft drinks. Westlife

Development which operates McDonald's restaurants in the western and southern parts of India has said that all its outlets are replacing single-use plastic with eco-friendly and biodegradable alternatives. It claims to have replaced plastic cutlery with wooden cutlery, plastic cups with paper cups, introduced biodegradable lids for beverages and paper straws. Local food chain like Haldiram and quick eating joint like Wenger's have also shifted to wooden cutlery. Many other restaurants across the country have started eliminating the plastic straws and plastic cutlery. But the change till now in this category is probably a drop in the ocean, as the number of food joints in the country is in millions and most are still using plastic.

Food delivery providers have also started looking at alternatives. In 2017, Zomato was the first to come up with 'don't send cutlery' option. The food tech unicorn is also working with research-based start-ups to introduce high-quality eco-friendly packaging. Swiggy has been also running a marketplace called Swiggy Packaging Assist, through which it enables restaurant partners to get access to a variety of packaging solutions including eco-friendly options made of paper and glass materials.

Retail giants like Walmart is partnering with its private labels on a number of initiatives including achieving 100% recyclable, reusable or compostable packaging for private brands by 2025, achieving 20% post-consumer recycled content in private brand packaging by 2025, labelling all food and consumable private brand packaging with the "How2Recycle" label by 2022, eliminating the non-recyclable packaging material PVC in general merchandise packaging by 2020 and decreasing private brand plastic packaging.⁴⁰ Walmart owned Flipkart and online retail giant Amazon are vocal about their efforts to reduce single use plastic. Amazon India announced in 2019 its commitment to eliminate single use plastic from its packaging by June 2020. The largest online market place has introduced 'paper cushions', which will replace plastic dunnage like air pillows and bubble wraps, used to fill the void space inside packages to ensure that the product is well protected in transit. This follows Flipkart's announcement earlier, where it committed to eliminating single use plastic in the packaging in its supply chain by March 2021.

Bizongo, a packaging solutions provider from India, said it is looking at a gradual elimination of single use plastic by pushing for alternatives that are already available, by 2021. They are trying to cut down the cost of alternate material while also promoting by better adaptation. They are also trying to use materials that can be reused multiple times before end-of-life.

Many major businesses, such as Ikea and Starbucks, have vowed to phase out single use plastics. One of the most popular moves companies have made to meet this target is to

PICTURE 10: Inside of a Zero waste shop

FIGURE 63:







PICTURE II: Soap bottle (Source: Instagram)



eliminate the use of plastic straws and single use plastic cups.⁴¹

A new trend is also emerging which encourages customers to bring their own reusable packaging. Unlike most conventional stores, these shops follow a zero-waste buying experience. The products sold here are not stored or sold in plastic. Customers need to bring their own bags or containers to purchase goods and if one forgets to carry a bag, the store will provide you one. You can fill the jar with the products you intend to buy - like grains, pulses, herbal teas, oils, etc. Once done, you can weigh it, note down the product id, and pay the amount at the counter. The concept is still at a nascent stage but a one which can change how we buy things. These shops have opened in some metros in the country but needs patronising for the concept to spread and become mainstream.

Small conscious brands are also looking at innovative solutions. For example, Berlin-based product designer Jonna Breitenhuber has come up with an interesting way to get rid of plastic shampoo and body wash containers: by packaging the liquids in bottles made of slow-dissolving soap. Soapbottle is a packaging made from soap. As the content within the soapbottle gets used, the soap packaging gradually dissolves.

Tomorrow Machine, a Swedish design studio based in

Stockholm & Paris, has a series of food packages where the packaging has the same short life span as the foods they contain. For example, they have Oil package which is made of caramelized sugar, coated with wax. To open it you crack it like an egg. When the material is cracked the wax does no longer protect the sugar and the package melts when it comes in contact with water. This package is made for oil-based food. Rice Package, made of biodegradable beeswax, has to be opened like peeling a fruit. The package is designed to contain dry goods, for example grains and rice.

These changes have been brought about by the constant scrutiny by environmentalists and activists across the world, who have been publicly criticizing industries as well as consumer groups. Collaboration and collective action are vital for transforming how plastic is used and managed at end of life, particularly if we are to advance the circular economy. And even individuals can affect big changes! One such example is a twitter comment on a Board meeting photo shared by The Mahindra group, showing usage of plastic mineral water bottles. The comment led to Mahindra group leader apologizing and pledging against usage of them in office premises. Power of social media in full display!

Though innovations are happening globally, India is still far behind in that. Industries may be speaking volumes in their efforts towards combating plastic waste, primarily single use plastic, but most of these efforts are about recycling. As plastic can only be down-cycled, more efforts need to be made to invest in research pertaining to the alternatives and their viability.



Idea that clicks

In a bid to reduce the usage of plastic, a lady in Gurgaon, part of National Capital Region, India opened a steel crockery bank. This unique bank lends citizens steel utensils for functions and occasions free of cost.



8. CONCLUSION AND RECOMMENDATIONS Steps required for change

Plastic is everywhere, at homes, workplaces, hotels, hospitals, entertainment space- even in soil, water, air- and now inside animals and human bodies⁴²! Since the mass production of plastic began six decades back, billions of tons of plastic have been produced; most of it in form of disposable products, and much of it is now trash. Almost six billion tonnes of it - approximately 91% - has been littered, dumped in landfills and water bodies- effectively polluting our air, land and water. The amount of marine litter in oceans and seas is growing, to the detriment of ecosystems, biodiversity and potentially human health and is causing widespread concern. Plastic production, consumption and disposal are connected and integral to global economy, and increasingly to our environment. The benefits of plastic are undeniable; but so are the burdens of this non-biodegradable material.

Decades of consumerism, fuelled by the concept of shortterm convenience, has left our planet drowning in plastic waste. Much of it is used just once and then thrown away. Plastic, on account of mass production and low, costs has become a material that can be easily disposed off. This culture of waste generation is clearly perilous and unsustainable. The issues around plastic waste management are complex, fuelled by increasing volumes of disposable single use plastics that are persistent and prone to littering. The problem is not just of a 'foreign' material but is also of the chemicals and toxicity it

'single-use plastics that take five seconds to produce, are used for five minutes, then take 500 years to break down again'

Frans Timmermans, vice-president of the European Commission

carries. Due to its persistency, toxicity and significantly large volumes, these impacts get compounded with time and accumulate plastic waste on the planet. We are already unable to cope with the amount of plastic waste we generate, and with the predicted growth in plastic market, we will be soon reaching a point of no return.

Single-use plastics are attracting considerable local, national and international interest and UNEP and other international organisations and governments are increasingly calling for action on single use items. This report seeks to further the public conversation around a range of single-use plastic products that are impacting our environment.

The study findings clearly busts two big narratives that the plastic industry has been putting forth- **Plastic is recyclable** and **Consumers are not ready for alternatives**.

Consumer is certainly ready

Our consumer study clearly showed that the common man is ready for change. Given a choice, people were willing to eliminate single use plastic and opt for alternatives. The strong voice from the general public favouring bans on many of the single use plastics items is a clear indication that the perils of single use plastic is being recognised and there is a growing concern among people on waste issues. But the study also indicated that there is still a lot of ambiguity over the understanding of single use plastic hence the need for clarity.

Preference for steel, glass, cloth, paper etc. for different usages came out strongly in the consumer survey. Bio plastics emerged as one of the new and popular choices, especially for bags, along with the traditional alternatives like cloth, jute, paper etc. But this probably needs a lot more research and understanding, which is currently lacking. Any new material, which is going to be showcased as an alternative to plastic, needs to go through a proper life cycle analysis. We certainly don't want another 'Plastic' problem on hand, couple of decades later.

The big revelation and a huge positive from the survey is the consumer support to eliminate use of single use plastic. With the tirade against plastic catching momentum, we are increasingly being bombarded with launch of new materials — things like '100% recyclable packaging', 'made with biodegradable plastic' or 'plastic free alternatives'. Unfortunately, by bringing in alternatives, companies are not addressing the throwaway model, which is resulting in increasing volumes of waste. Our SWOT clearly showed that though there are many alternative materials, all of them come with their own problems. For example, if we replace all plastic straws with paper ones, that would still result in huge volumes of waste- and huge carbon footprints. So, in many cases- not in all, the solution is to eliminate unnecessary usage and we found this popular with the consumers. Consumer clearly showed that they are against this throwaway culture- they were against 'SINGLE USE'.

Plastic Recycling is not a solution

Since the 1990s, recycling of waste has become a feature of sustainable development- projected as the only way to handle waste problem. In response to the myriad problems that plastic use has created over the years, the industry has almost always responded by saying that plastic is recyclable- that too multiple times- and it is only a littering or waste management issue. Our current study, as well as earlier ones on plastics, presents a contrarian viewpoint.

The on ground survey with the informal sector brought out clearly that not all plastics, especially the single use ones that the study focused on, are profitable to handle and process- and if this is the scenario in informal sector, in the formal recycling spaces it will be worse. Many SUPs like multi layered plastic, small plastic pouches, noodle packets etc. are untouchables, even in a very competitive and loweconomic recycling spaces of informal sector. Plastic bags, straws, polypropylene products, balloon sticks, disposable pens are not really preferred materials and have very few

Most of us believe that through recycling we can solve the problem of plastic waste and save the environment, but this is far from truth.

takers. Also, the amounts recycled at present by this sector, is probably only a fraction of what is generated. Repurposing plastic into clothing like in case of PET does not put a dent into the vast amounts of PET bottles that we discard. And also, just changes form- because the plastic clothing will not just release microfiber during use and wash, but will also finally end up in the landfill.

For most other SUPs, which are currently getting recycled in the unorganised sector, under poor conditions, the big question is that will it be economically viable to recycle them when we set standards and environmentally sound processes in place. The profit margins in plastic collection, sorting or trading, as shared by the informal players during the study, are low and may become thinner if these waste streams are shifted to formal recycling sector. Moreover, materials like plastic bags, polystyrene packaging can in theory be recycled, but for logistical and economic reasons, recycling only makes sense when clean material is available in quantity. The presence of foreign materials—from food to dissimilar kinds of plastic—can ruin an entire batch of would-be recyclables. This is not the case for post-consumer household waste, so for most recycling plants these are impractical materials to collect for recycling. If they are collected, the extra effort and expense required to separate them from general waste means they often end up in landfill. And that is the reason we found in our studies that many small and soiled items were never collected by waste pickers.

There are more than 50 different types of plastics and since each type can only be recycled with its specific polymer type, plastics need to be carefully sorted before they can be processed. Also, different types of Plastics have overlapping densities over a very narrow range, making at times automated processes unreliable, unlike other recyclable materials like metals. Plastic sorting can be done manually, but it's tedious and labour-intensive and increases cost. Many plastic packaging also consists of more than one polymer type, which makes them more difficult to recycle.

Recycling has its limitations because plastic materials cannot be recycled forever; it is because plastic, in most cases, is not really recycled but actually DOWNCYCLED. Plastic consists of a long chain of polymers, and each time it is recycled the chain gets shorter, resulting in a lower quality plastic. And eventually, the plastic will need to be discarded. Also, in each cycle the recycler has to deal with contamination present in the material.

Though the plastic industry will like us to believe that plastic recycling is the safest and the most environment friendly industry, it is far from true. Though in this particular study, we focussed on collection and handling of SUPs, our earlier studies on plastic have time and again pointed out the hazards in this industry. Most plastic contain a blend of chemicals—plasticizers, moulding agents, dyes—that combine to give a plastic its shape, colour, strength, and flexibility. Many of these chemicals are toxic and recycling them without any precaution can result in contamination of entire chains. In India, a typical plastic recycling unit is oblivious of these concerns and contamination like this is common.
Alternatives to Recycling: Reduce and Reuse

So how does one solve the problem of plastic pollution?

Although recycling has been hailed as the key to solving this problem, the answer is lying somewhere else. Though waste hierarchy has been often talked about, it has been not so popularly applied to plastic waste issue. Reducing and reusing are the more powerful solutions than recycling, especially when we are talking about Single use plastic.

The consumer survey and the initiatives around the world have clearly shown that many SUPs are possible to be eliminated and we don't really need alternatives, point in case- straws, plastic cutlery, some of the packaging and pens etc. So, this is not just about reducing the plastic, but also about reducing SINGLE USE. It is time to revisit what our earlier generations did- in many cases we will find the answers there to reduce our consumption of disposable plastic. The steps in this direction, individually as well as at community level, can result in massive reduction in use of SUPs. Many countries, especially Europe are now setting ambitious quantitative targets for select SUPs to achieve reduction and promote reuse. This would mean consumption reduction targets.

Reusing or repurposing products can also contribute to delaying the 'product to waste' process and hence contribute to lower plastic waste. This could be interpreted and achieved through two ways. The preferable way is through promoting and supporting Reusable alternatives to these single-use plastic items, rather than single-use substitutes made of another material. Carrying your own cloth bag or steel straw can be example of such replacements. The second and the lesser preferable option is to replace them with other bio degradable single use products; example like paper straws, paper packaging etc.

Figure 64: Plastic waste hierarchy



Recycling, Energy recovery and disposal to landfills are quite popular strategies, though not the most preferable from environment point of view. Since the industry has been pushing for these for decades, these probably do not require detailing. But it is important to ensure that collection, sorting of recycling are done under strict norms, to ensure that there are no contamination and environmental emissions and also there is optimal recycling or energy recovery. Landfilling of non-recyclables should be minimized- not just because landfill spaces are becoming rare but also because we are still far from understanding implications of it – especially from the point of view of microplastics.



Recommendations

- **1.** Identifying the most problematic single-use plastics: The study has identified some SUPs which are problematic and also where elimination or feasible alternatives are available-
 - Polythene Bags
 - Straws
 - Polypropylene Products
 - Plastic Satchels
 - Plastic Balloon Sticks
 - Single Use Plastic Pens
 - Packaging materials (Styrofoam, bubble wraps etc.)

This list can be the starting list and can be expanded over phases.

2. Regulatory instrument to restrict usage of identified SUPs: Various instruments-economic, regulatory and voluntary or a combination of these can be used to phase out some of these SUPs. In an Indian scenario, regulatory measure is probably a necessity to trigger any action. But as a standalone, it may not be able to achieve any significant change and hence will need to be used in combination with economic measures.

There is also need to curb certain usage through guidelines, especially on packaging. For example make it mandatory to give choice to consumers for -

- Plastic Packaging in E-commerce Retail
- Plastic Packaging in Food Delivery
- 3. Consumer Programmes: Though our study did suggest that there is a growing awareness among consumers regarding the need to eliminate plastic, there is a huge gap when we look at the behavioural change. The industry and the government, along with civil society organisation will need to step up their efforts to bring about this change. The consumers have the power to make voluntary choice which can force the industry to shift gears.

In Maharashtra, a refundable surcharge of 50 paise per plastic packets will be returned by the retailers when the customer returns empty milk packets after consumption.

4. Promoting Alternatives: The use of eco-friendly

alternatives can be facilitated through the introduction of economic incentives (including tax rebates, research and development funds etc.). For instance, Antigua and Barbuda have legislated, as part of the plastic bag ban, that certain materials used to manufacture alternatives are to be kept tax-free, including sugar cane, bamboo, paper, and potato starch. Financial incentives can reduce the costs of alternatives and result in mass consumption.

Research into biodegradable and plant-based materials has to be accelerated, as experts have pointed out there can be problems with the way some of these materials break down in the environment. Adoption of any new material needs to be done after thorough research.

- 5. Industry Participation: Globally large corporations are now beginning to think about SUPs and ways to reduce them. Efforts have to be made in India as well to bring on board international, national as well as local industry to look at alternatives and phase out single use plastics. Also, in case of usage where there are no alternatives, EPR will need to be introduced and implemented strictly.
- 6. Governance holds the key: Most environmental rules have failed to trigger change on ground, primarily because of lack of enforcement by regulatory agencies. The plastic bag ban in many states in India is a case in example. Though the ban is in place in most states, plastic bags are available and distributed openly and no action on violation are taken. Even if there is action, those are sporadic and not sustained and the end result is non-compliance. Any restriction on SUPs will have to be though along with enforcement plan.

Besides these measures on Single use Plastic, the regulatory agencies need to strengthen the implementation of

Plastic Waste Management Rules. EPR needs to be enforced and made more accountable through introduction of targets.

Focus needs to be also brought in on improving recycling percentages as well as efficiencies. As mentioned above, the current recycling is really down-cycling and needs to be looked at. Plastic recycling standards need to also focus on identifying toxicity and contamination related concerns. Studies have found carcinogenic chemicals like Deca BDE in plastic applications that are not require having them- which is a direct result of mixing of plastic, irrespective of their toxic contaminants. Standards will be required to ensure that plastic with toxic additives or stabilizers are isolated and suitably disposed off or used in applications designed to contain them.

Informal Sector has a huge potential of being involved in the formal process of recycling as they already have semiskilled manpower. Instead of shutting them out, they need to be integrated. Alternative Livelihood has to be provided to the manufacturers and labourers involved in the plastic products being banned.

Everybody can do it: Some voluntary steps that consumers can take-

- Carry your own reusable bags and refuse plastic bags at shops.
- Carry your own water bottles
- Refuse straws
- Avoid buying packaged food
- Say no to disposable cutlery
- Demand for optional packaging in online shopping etc
- Pack a travel kit with reusable cup, spoon etc.
- Buy in bulk to avoid small packaging waste
- Don't cut off corners of food plastic packaging completely.

Plastic waste is a huge global issue and probably need a global intervention to reduce its impacts. International and national bodies have to come together to find sustainable solutions. But it is time that we start doing that.

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Annexure - I

QUESTIONNAIRE FOR PLASTIC RECYCLING

1.	Name of the Respondent						
2.	Are	Area of operation					
3.	Type of Operation						
	a) Dealer/Kabadiwala b) Waste Segregator/Sorter c) Rag-picker						
4.	Size of the unit						
	a.	< 25 yards ²	b. 25-50 yards ²	c. 50-10)0 yards ²	d. 100-150 yards ²	
	e. 1	.50-200 yards ²	f. >200 yards²				
5.	. If unit, number of workers						
	a.	a. Men- b. Women- c. Children- <14 years, or 14-18 years					
6. Which all single-use plastics are being picked up for recycling?							
	a. Polythene Bags >50 micron						
	b.	b. Polythene Bags <50 micron – Thin Plastic Bag					
	C.	c. Packaging Material – (Boxes)					
	 d. Packaging Material – (Wrappers/ Packets) e. Personal care product packaging – (Shampoo/ Body Wash Bottles and tubes) 						
	f. Packaging Material – (Small FMCG Plastic Pouches)						
	g.	g. Toothpaste Tube					
	h. Thermocol/ Styrofoam Products						
	i. Plastic Disposable Cups/ Plates						
	j. Low Grade PP Products (Biscuit Trays, Certain Packaging, Seal Plastic covers)						
	k.	k. Maggi Packets					
	l.	. Multilayered Packaging – (Chips/ Biscuits)					
	m.	m. PET Plastic Bottle					
	n.	n. Straws					
	o. Balloon sticks						
7.	If Yes, How much do you sell it for (per kg- item wise)						
8.	If No, Why is not picked up or thrown away?						
	a) No Cost Benefit						
	D) DImcult to Segregate						
	C)	Multilayered					
d) low plastic quality							
	e)	No market for se	elling these items				
0	†)	Others:					
9. 10	HO	Tow much of these items do you collect/segregate monthly					
10.	vvn	nation you do with the plastic which is not of use?					
	 a) Burn It b) Throw it in the drain c) Put it in municipal waste bin d) Dump in open areas a) Othere 						
	e) Others						

11. How much quantity of plastic is thrown away monthly?

Annexure - 2

QUESTIONNAIRE - CONSUMER BEHAVIOR

Email address *

Age

Sex

Name

Your answer

Which products according to you are Single Use Plastic? *

- Polythene Bags
- Packaging Material
- Plastic Tiffin boxes
- Disposable Plastic Cutlery
- Thermocol Cups/ Plates
- Disposable Cups/ Plates
- Toothpaste and shaving cream tubes
- Personal Care Products Plastic Packaging (cream boxes, shampoo bottles, facewash tubes etc.)
- Plastic Buckets
- Plastic Balloon sticks
- Mineral Water Bottles
- Plastic Straws
- Non refillable pens

Plastic Bags

Do you take plastic carry bags from grocery and vegetable sellers? *

- a) Every time
- b) Sometimes
- c) Occasionally
- d) Never

What do you think is the best alternative to plastic bags for grocery shopping? *

- a) Jute Bags
- b) Cloth Bags
- c) Paper Bags
- d) Bio-plastic Bags
- e) Other:

Did you know that plastic bags less than 50 microns thickness are banned in India? *

- a) Yes
- b) No
- c) Not sure

Do you think plastic bags should be completely banned in India? *

- a) Yes
- b) No
- c) Not sure

*Required

E-commerce Retail

Do you use online shopping websites to order products? *

- a) Yes
- b) No

If yes then do you think that online shopping products are packed using excessive and unnecessary plastic packaging? *

- a) Yes
- b) No
- c) Maybe
- d) Not applicable (If you don't use online shopping)

Would you choose less plastic packaging if given a choice while ordering products online? *

- a) Yes
- b) No
- c) Not Sure

Do you think that there should be government guidelines on amount of plastic packaging used by online shopping companies? *

- a) Yes
- b) No
- c) Not sure

Events and Functions

Public and Private

Have you used plastic or thermocol disposable cups/ plates / cutlery in events/ function organized or attended by you? *

- a) Yes
- b) No

Are you aware of what happens to those disposable cutleries once the event is over? *

- a) Yes
- b) No

What do you think is the best alternative to plastic or thermocol disposable cups/ plates / cutlery in events or functions? *

- a) Steel
- b) Glass
- c) Bio-plastic Cups/ Plates/ Cutlery
- d) Leaf plates
- e) Other:

Do you think plastic or thermocol disposable cups/ plates / cutlery should be banned in public and private events and functions? *

- a) Yes
- b) No
- c) Not sure

Food Delivery - Plastic Cutlery

Do you order food online? *

- a) Yes
- b) No

If yes, would you choose to NOT take plastic cutlery with food ordered online if given a choice? *

- a) Yes
- b) No
- c) Maybe
- d) Not Applicable

What do you think is the best alternative to plastic cutlery in food delivery? *

- a) Paper cutlery
- b) Bio-plastic cutlery
- c) No need for cutlery
- d) Other:

Do you think that Plastic Cutlery with food delivery should be banned? *

- a) Yes
- b) No
- c) Not Sure

Plastic Straws and Stirrers

Do you use plastic straws/stirrers in restaurants or home? *

- a) Yes
- b) No

Would you choose to NOT take straws/stirrers at restaurants if given a choice? *

- a) Yes
- b) Not sure

What do you think is the best alternative to plastic straws? *

- a) Paper Straws
- b) Metal Straws
- c) Drink directly from the glass
- d) Other:

Do you think plastic straws should be banned? *

- a) Yes
- b) No
- c) Not Sure

Awareness

Are you aware of the environmental impact of single use plastic? *

- a) Yes
- b) No
- c) Not sure

Are you aware that single use plastic is a major contributor to marine pollution? *

- a) Yes
- b) No

Do you think chemical additives used in Plastic can leach out to food? *

- a) Yes
- b) No
- c) Not sure
- d) No information

Do you think chemical additives used in Plastic bottles can leach out to water? *

- a) Yes
- b) No
- c) Not sure
- d) No information

Are you aware of pollution caused by Microplastics? *

- a) Yes
- b) No

Have you heard about Plastic Waste Management Rules, 2016? *

- a) Yes
- b) No



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