PLASTIC A LEADING ENVIRONMENTAL HAZARD: INDIAN PERSPECTIVE

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Abstract

Plastic waste is a major environmental and public health problem in India and the World, particularly in the urban areas. Plastic shopping or carrier bags and its other products are one of the main sources of plastic waste in our country. Around most towns and cities in India the approach roads are bedaubed and littered with multi-coloured plastic bags and other garbage. Modern methods of disposal such as incineration and the development of sanitary landfills, etc. are now attempting to solve these problems. Lack of space for dumping solid waste has become a serious problem in several cities and towns all over the world Besides, plastic bag wastes contribute to blockage of drains and gutters, are a threat to aquatic life and human survival when they find their way to water bodies, and this exigency is multiplied due to apathy of present plastic disposing administration.[1] Consequently, Government of India by notification has come up with Plastic Waste (Management & Handling) Rules, 2015 to tackle the problem which though is very innovative yet needs to be worked upon. Furthermore, general mass's attitude towards this problem needs to be overhauled because this problem's root is attached to them and Government needs to spur scientific community too to come up with solution to this conundrum, which presently is not apropos.

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[1] N. M. dana Gopal, P.Phebe, E.V.Suresh Kumar and B.K.K.Vani (2014). Impact Of Plastic Leading Environmental Pollution. Retrieved from http://www.jchps.com/pdf/si3/20%20jchps%20si3%20N.%20M.%20dana%20Gopal%2096-99.pdf

INTRODUCTION

Plastics are macromolecules, formed by polymerization and having the ability to be shaped by the application of reasonable amount of heat and pressure or any other form of forces. This great human creation changed the world and brought comfort to our lifestyle. Now plastics are in all human activity ranging from clothing to shelter, infrastructure to communication, agriculture to construction, hardware to packaging and entertainment to health care. Its attractive properties, lightweight and high strength meets a large share of the materials needs of man and that too at a comparatively lesser cost. Plastic that few decades ago considered to be boon for progressive society is now turned out to be a grim curse. It is *an elephant in the room* that we all are aware of but abstain to talk. Manufacturing of Plastic is very inexpensive process as compared to its ubiquitous purchase and use; but its unplanned production paying no heed as to its disposal system has led us to the most appalling and precarious situation where in the words of Supreme Court "India is sitting on a Plastic Time Bomb" and "Plastic bag is a threat more serious than atom bomb." Moreover India has been ranked as Seventh among most environmentally hazardous country in the world by a new ranking released recently. The study is based on evaluation of "absolute" environment impact of 179 countries, whose data was available and has been done by researchers in Harvard, Princeton, Adelaide University and University of Singapore on January 12, 2011. Thus it has become imperative for welfare state that India is to circumscribe its blatant affect and we require law to act as panacea and obviate this staggering conundrum.

It is estimated that annual global plastic consumption has reached to an overwhelming figure of 297.5 million tons by the year 2015 as per 2012 of Global Industry Analysts. Tons and tons of plastic debris are discarded every year everywhere polluting lands, rivers, coasts, beaches and oceans. Around 300 tons of Marine plastic debris ended up on the shores of India's coasts in the year 2014.

Administrator's ineptitude and apathy is manifested from the fact that the ban on 'gutka' and 'Paan Masala' laced with Tobacco is not at all effective as manufacturers are playing truant with law and which is compounded by lethargic and indolent state machinery.

Around most towns and cities in India the approach roads are littered with multi-coloured plastic bags and other garbage. Waste is also burnt to reduce its volume. Modern methods of disposal such as incineration and the development of sanitary landfills, etc. are now attempting to solve these problems. Lack of space for dumping solid waste has become a serious problem in several cities and towns all over the world. Dumping and burning wastes is not an acceptable practice today from either an environmental or a health perspective. Today disposal of solid waste should be part of an integrated waste management plan. The method of collection, processing, resource recovery and the final disposal should mesh with one another to achieve a common objective.

As per central pollution control board's (CPCB) estimation around 56 lakh tonnes of plastic waste is generated annually in India. As per report around 9205 tonnes per day are collected and recycled and 6137 tonnes remain uncollected and litter in which Delhi accounts for 689.5

tonnes per day, Mumbai 408.3 tonnes per day Chennai 429.4 tonnes per day and Kolkata 425.7 tonnes per day and around 40% of plastic waste is not recycled.

As per the recent survey conducted by CPCB (Central Pollution Control Board) in 60 major cities found that 15,342.46 tonnes of plastic waste was generated amounting to 56 lakh tonnes a year. Commenting on this lamentable data Supreme Court hearing a PIL said, "We have a habit of collecting garbage from cities and dumping them in villages. Representatives of villagers have stopped being abreast with the problems arising from such dumping."

CAUSES OF PLASTIC POLLUTION

Plastic Pollution means accumulation in the environment of man-made plastic products to the point where they create problems for wildlife and their habitats as well as for human population[2].Some of the causes of plastic pollution are:

1) Urbanization and Industrialization - Increasing urbanization and industrialization have contributed for increased plastic generation. This increase has been rapid since the middle of the 19th century which has affected the quality of environment.
2) As plastic is less expensive, it is overused. When it is disposed of in landfill sites, it does not decompose at a fast rate, and hence pollutes the land or soil in that area[3].
3) Most people tend to throw plastic bottles and polythene bags away, even after a single use. This drastically increases its pollution rate on land as well as in the oceans, mainly in the developing and underdeveloped countries[3].
4) Plastic bags, plastic bottles, discarded electronic components, toys, etc., clog the water bodies like canals, rivers, and lakes, especially in the urban areas[3].
5) Every year, about 100 million tons of plastic are produced all over the world. Out of this, 25 million tons of non-degradable plastic gets accumulated in the environment[3]
6) Approximately 70000 tons of plastic are dumped in the oceans and seas globally. Discarded fishing nets and other synthetic material are eaten by terrestrial as well as aquatic animals, by mistaking them for jellyfish or food, leading to the bio-accumulation of plastic inside their bodies. This can cause choking in them, ultimately leading to their death. Scores of fish and turtles die every year because of this[3].

PLASTICS ARE MAINLY USED IN THE FOLLOWING INDUSTRIES

a. Packaging. b. Storage.

c. Disposables d. Construction etc.

TYPES OF PLASTIC POLLUTION[4]

[2] Moore, Charles; Plastic Pollution. Retrieved from http://www.britannica.com/science/plastic-pollution

[3] Gaikwad, Amruta (2011, September 29). Plastic Pollution: Causes and Effects. Retrieved from http://www.buzzle.com/articles/effects-of-plastic-pollution.html

[4] Different Types Of Plastics And Their Classification. Retrieved from http://www.ryedale.gov.uk/attachments/article/690/Different_plastic_polymer_types.pdf

The Society of the Plastics Industry (SPI) established a classification system in 1988 to allow consumers and recyclers to identify different types of plastic. Manufacturers place an SPI code, or number, on each plastic product, usually moulded into the bottom. This guide provides a basic outline of the different plastic types associated with each code number.

Plastic Type	General Information	General Properties	Common Household Uses
1. PET	PolyethyleneTerephthalate sometimes absorbs odours and flavours from foods and drinks that are stored in them. Items made from this plastic are commonly recycled. PET(E) plastic is used to make many common household items like beverage bottles, medicine jars, rope, clothing and carpet fibre	Good gas & moisture barrier properties,High heat resistance,clear,hard tough,microwave transparency, solvent resistant	Mineral Water, fizzy drink and beer bottles Pre-prepared food trays and roasting bags Boil in the bag food pouches Soft drink and water bottles Fibre for clothing and carpets Strapping Some shampoo and mouthwash bottles
2.HDPE	High-Density Polyethylene products are very safe and are not known to transmit any chemicals into foods or drinks. HDPE products are commonly recycled. Items made from this plastic include containers for milk, motor oil, shampoos and conditioners, soap bottles, detergents, and bleaches. It is NEVER safe to reuse an HDPE bottle as a food or drink container if it didn't originally contain food or drink.	Excellent moisture barrier properties Excellent chemical resistance Hard to semi-flexible and strong Soft waxy surface Permeable to gas HDPE films crinkle to the touch Pigmented bottles stress resistant	Detergent, bleach and fabric conditioner bottles, Snack food boxes and cereal box liners, Milk and non-carbonated drinks bottles, Toys, buckets, rigid pipes, crates, plant pots, Plastic wood, garden furniture, Wheeled refuse bins, compost containers

3.PVC	Polyvinyl Chloride is sometimes recycled. PVC is used for all kinds of pipes and tiles, but is most commonly found in plumbing pipes. This kind of plastic should not come in contact with food items as it can be harmful if ingested.	Excellent transparency Hard, rigid (flexible when plasticised),Good chemical resistance, Long term stability, Good weathering ability, Stable electrical properties, Low gas permeability	Credit cards, Carpet backing and other floor covering, Window and door frames, guttering, Pipes and fittings, wire and cable sheathing, Synthetic leather products
4.LDPE	Low-Density Polyethylene is sometimes recycled. It is a very healthy plastic that tends to be both durable and flexible. Items such as cling-film, sandwich bags, squeezable bottles, and plastic grocery bags are made from LDPE.	Tough and flexible, Waxy surface Soft – scratches easily, Good transparency, Low melting point, Thick shopping bags (clothes and produce), Stable electrical properties, Good moisture barrier properties	Films, fertilizer bags, refuse sacks, Packaging films, bubble wrap, Flexible bottles, Irrigation pipes, Thick shopping bags (clothes and produce), Wire and cable applications
5.PP	Polypropylene is occasionally recycled. PP is strong and can usually withstand higher temperatures. It is used to make lunch boxes, margarine containers, yogurt pots, syrup bottles, prescription bottles. Plastic bottle caps are often made from PP	Excellent chemical resistance, High melting point Hard, but flexible Waxy surface, Translucent plant, Strong	Most bottle tops, Ketchup and syrup bottles, Yoghurt and some margarine containers, Potato crisp bags biscuit wrappers,crates,plant pots, drinking straws, Hinged lunch boxes, refrigerated containers, Fabric/ carpet fibres, heavy duty bags/tarpaulins
6.PS	Polystyrene is commonly recycled, but is difficult to do. Items such as disposable coffee cups, plastic food boxes, plastic cutlery and packing foam	Clear to opaque, Glassy surface, Rigid or foamed, Hard, Brittle, High clarity, Affected by	Yoghurt containers, egg boxes, Fast food trays, Video cases, Vending cups and disposable cutlery, Coat hangers, Seed

	are made from PS.	fats and solvents	trays
7. Others	Code 7 is used to designate miscellaneous types of plastic not defined by the other six codes. Polycarbonate and Polylactide are included in this category. These types of plastics are difficult to recycle. Polycarbonate (PC) is used in baby bottles, compact discs, and medical storage containers.	There are other polymers that have a wide range of uses, particularly in engineering sectors. They are identified with the number 7 and OTHER (or a triangle with numbers from 7 to 1	Nylon (PA) Acrylonitrile butadiene styrene (ABS) Polycarbonate (PC) Layered or multi-material mixed polymers

ADVERSE EFFECTS OF PLASTICS ON ENVIRONMENT

a) Many stray animals end up eating plastic bags and other plastic material mistaking them for food due to improper disposal systems, and this ultimately cause their death. In small cities and villages of India, milch animals are reported to be the most suffered victims of this administrative apathy; as stated by NGOs ***Karuna Society for Animal*** and ***Vishaka Society for Protection and care of Animals*** -"Due to government neglect across the country, animals particularly cows and bulls are ingesting plastic from garbage dumps and plastic bags are littered across the landscape and oceans. The ingestion of plastic bags chokes the stomach of cows and up to 60 kg of plastic bags were found in the stomachs of cows. What appears to be a healthy cow is in fact a plastic-choked cow or a cow full of plastic". And thus we are way behind in achieving our Constitutional goal as provided under Article 48.

b) Littering of plastics in the form of plastic bags causes blocking of the cities, municipalities sewerage systems leads to spreading of water borne diseases and increasing the cost of sewerage maintenance systems especially during the rainy season, the plastic rubbish that falls on the road gets washed away into the nearby water reservoirs, canals, and drains, leading to their choking up and overflowing. Flood that came in 1988 in the local areas of Mumbai is an epitome in this regard. And back flush of sewerage waters in such time *adds insult to injury* especially in small cities whose drainage system has not been planned to cope up the ever increasing population pressure causing variety of diseases like skin diseases, water borne diseases and vector borne diseases.

c) When dumped in landfills, plastic materials interact with water and form hazardous chemicals. If these compounds seep down towards groundwater aquifers, they degrade the water quality, leading to groundwater pollution. Moreover, soil fertility is also affected due to plastic materials as they form part of manure remaining in the soil for years without natural degradation.

d) Plastic pollution in marine water bodies leads to innumerable deaths of aquatic animals, and this also affects the aquatic plants to a considerable degree. More than 90% of the articles found on the sea beaches contained plastic. Turtles are highly susceptible to swallowing plastic bags as they strongly resemble their target prey - jellyfish & squid. According to National Oceanographic and Atmospheric Administration, plastics debris kills an estimated 100,000 marine mammals annually and various birds like Albatross. As per 2006 Greenpeace Report-*Plastic Debris In the World's Oceans* nearly 267 animal species are known to have suffered from plastic entanglement and ingestion[5].
e) Blockage due to plastic accumulation may form shelters for the breeding of mosquitoes and other harmful vectors insects, which might cause numerous diseases in humans.
f) Plastic incineration emits very poisonous gases adding much to air pollution. Pollution of environment by industries manufacturing the plastic materials is another serious issue that is faced by the environmentalists and the governments globally. The manufacturers of plastic materials are polluting the environment by disposing of the plastic waste and chemicals used in the process of manufacturing plastic material into nearby water channels and open spaces thereby causing health hazards as well as environmental pollution in a vast area.
g) Recycling requires laborers, who are at the risk of developing skin and respiratory problems due to inhalation of toxic chemicals.
h) Styrofoam- Styrofoam is one of the most environmental toxins found in plastic. This highly durable spawn also known as polystyrene, is manufactured using benzene, from coal; styrene, from petroleum; and ethylene, a "blowing agent" used in the process since the crackdown on CFCs. Extracting these raw materials generates air and water pollution, and the process of whipping them together can lead to lung cancer and neurological problems in factory workers.

Like all plastics, polystyrene is non-biodegradable. Even after a take-out container has dissolved 500 years from now, its chemical components will still clog the eco-system. Research on whether polystyrene chemicals "migrate" from container to food is hotly debated, but it's a fact that styrene has been present in our fatty tissue and breast milk for the past 30 years[6].

POISONOUS EFFECTS OF PLASTIC ON HUMAN BEINGS

Human beings are not untouched by the Poisonous effects of Plastics anymore. Some of the harmful effects of plastics are following:

i. Hot food in Plastic Bags may cause cancer.

[5] Claire Le Guern Lytle . When The Mermaids Cry: The Great Plastic Tide .Retrieved from http://plastic-pollution.org/
[6] Protect our Planet from Plastic pollution. Retrieved from http://www.gits4u.com/envo/envo20.htm

ii. Plastic poses serious environmental problem. The Plastic Bags used for packaging food are very dangerous as they contain polyethylene, polystyrene, polyvinyl chloride (PVC) which may cause *Minamata Disease* if we contaminated fish. And also a long continuous exposure (one to three years) in humans, vinyl chloride can cause deafness, vision problems, circulation disorders and bone deformities. Vinyl chloride can also cause birth defects[7].

iii. It is considered to be medically approved fact that if a person eats food items carried in Plastic Bags for a long period he or she is very likely to get serious health problems.

iv. Chemicals including styrene and bisphenol maximized by chemical exchange at high temperature when comes in contact with human body may cause cancer, heart disease and reproductive problems.

ALTERNATIVES AND SIMPLE MEASURES TO MINIMISE THE USE OF PLASTICS MATERIALS

a) Buy food in glass or metal containers as far as possible; avoid polycarbonate Drinking Bottles with Bisphenol A.
b) Avoid heating food in plastic containers or storing fatty foods in Plastic containers or plastic wrap.
c) Plastic toys must be abstained from purchase.
d) Avoid all PVC and styrene products.
e) Use paper or cloth bags for shopping and other purposes as much as possible and avoid bringing plastic bags at home.
f) Recycling of plastic products. Few reasons for advocating Recycling process are[8]

1. To reduce global warming 2. To prevent air and water pollution and land

3. To obviate land scarcity problem.

But all types of plastics cannot be recycled. Thus, if we recycle the ones that we can, environment will be saved to some extent.

Basic steps involved in Recycling[8]

Step 1-collecting plastic waste from household as well as industrial Waste

Step 2-sorting the plastics waste in different categories such as PET bottles, Bags, Containers, etc.

[7] Bharucha, E.(2004).Textbook of Environmental Studies for Undergraduate Courses. University Press (India) Pvt. Ltd

[8] N. M. dana Gopal, P.Phebe, E.V.Suresh Kumar and B.K.K.Vani (2014). Impact Of Plastic Leading Environmental Pollution.

Step 3- The Plastic is cut in tiny pieces.

Step 4- Tiny pieces are thoroughly washed for any dirt or unwanted particles on them.

Step 5-Washed pieces are melted and poured into small containers for reuse.

g) Road Construction - Wastes plastics are not disposed scientifically due to their non-biodegradability hence the disposal of waste plastic is now become a very big global problem. Recently these waste plastic materials were used as additives in road construction. Generally bitumen is used as binder in road construction and binding capacity of this bitumen is low but when plastic waste is mixed with hot bitumen and the resulted mix is used for road construction increase binding capacity of bitumen. The use of this innovative technology will not only strengthen the road construction but also increase the road life as well as will help to improve the environment. Plastic roads would be a boon for India's hot and extremely humid climate, where temperatures frequently cross 50°C and torrential rains create havoc, leaving most of the roads with big potholes. Dr. R. Vasudevan, Dean and Head of the Chemistry Department of the Thiagarajar College of Engineering (TCE) The man behind this mission is known as Madurai's 'Plastic Road Man'.The first ever plastic road (60 feet long) was laid inside the TCE campus in 2002, followed by a 700 m road in Lenin Nagar, Kovilpatti, the same year. Officially, the industrial town of Salem was the first in the country to lay a 350 m road on an experimental basis using plastic tar technology in 2004[9].
h) The German chemical company BASF makes **Ecoflex**, fully biodegradable polyester for food packaging applications which must be accepted and widely used.
i) **The Koen Tech Co Ltd**. of Korea claims to have produced a machine that can produce fuel oils (gasoline, kerosene and diesel) from waste plastic and waste synthetic resin. “The dioxin materials in the exhaust gas created by the oil recycling device operation are neutralized during the process,” says the product literature brought out by Koen Tech Co.

INDIAN LAWS ON PLASTIC WASTE AND MANAGEMENT

Right to public health is entailed in Article 21 of the Constitution and Supreme Court in ***Vincent Parikurlagara*** v. ***Union Of India;(1987) 2SCC165*** too upheld the same view stating the right to maintenance and improvement of public health is included in the right to live with human dignity enshrined in Article 21 of the Constitution. A healthy body is the very foundation of all human activities. In a welfare state this is the obligation of the State to ensure the creation and sustaining of conditions congenial to good health.

Apart from article 21, article 47, article 48A and article 51A too set constitutional duty and goal to be achieved by us and our state. According to article 47 the State shall regard the

[9] Ahmad,Wassem.(2014,Nov 22).Use Of Plastic Material In Road Construction. Retrieved from http://www.scind.org/48/Mindblower/use-of-plastic-material-in-road-construction.html

raising of the level of nutrition and the standard of living of its people and the **improvement of public health** as among its primary duties. The improvement of public health also includes the protection and improvement of environment without which public health cannot be assured. According to the Article 48A which states that "the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country" and sub-clause (g) of Art. 51A which says, "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". Thus above Articles above articles impose two-fold responsibilities, on the one hand, it gives directive to the State for protection and improvement of environment and on the other hand it casts/imposes a duty on every citizen to help in the preservation of natural environment.

Accordingly Environment Protection Act, 1986 came to achieve the goals set by above stated articles of our constitution and to achieve the objectives of Environment Protection Act1986, Air (Prevention and Control Of Pollution)Act 1981,Water(Prevention and Control) Act1974, Government drafted Plastic Waste & Management Rules,2015; some of its important provisions are as under

i. This rule recognizes the service of waste pickers and in its preamble too it states to involve them in the Plastic Waste Management and as per sub-clause (x) of section 3 of this rule they have defined them as "individuals VOLUNTARILY engaged in the picking of Recyclable Plastic Waste" & in its sub-clause (2)-(f) of section 6, *Urban Local Body* has been entrusted to engage civil societies or groups working with waste-pickers.

ii. In its section 4-conditions have been enunciated for the manufacture, stocking, distribution ,sale and use of carry bags , plastic sheets or like or cover made of Plastic sheet and multilayered shall be subject to following condition namely:-

   a) Use of coloured carry bags and coloured plastics has been banned in food items.
   b) Recycled Plastics or products made of recycled plastics shall not be used for storing, carrying, dispensing or packaging food stuffs.
   c) Previously thickness of Plastic Sheets was used to be 40 microns which has now been increased to 50 microns.
   d) Plastic material shall not be used in any package for packaging *Gutka, Pan Masala & Tobacco* in all forms

iii. The Draft Rules have mentioned that Bio-Degradable, Dry recyclable & combustible waste & Domestic Hazardous Waste shall be segregated at source in accordance with Solid Waste Management (SWM) Rules, 2015 and also these rules shall be encouraged to use plastic waste in Road Construction ,Energy Recovery & other processes. And, to encourage the use of labelled plastic the draft rules have imposed fines as per the Bye -laws of the Union Labour Board on street vendors/retailers who use unlabelled plastics.

iv. Price on plastic carry bags has been imposed to reduce their usage & shift people to other options.

v. The Draft Rules have included the responsibility of the generator which was earlier neglected and this is provided in section 8 of the Plastic Waste (Management & Handling) Rules, 2015.

vi. All imports and exports of Hazardous and other wastes have been banned with certain exception & this is provided under chapter 3 of Plastic Waste (Management & Handling) Rules, 2015.

vii. This rule also imposes responsibility on street vendors and retailers, as per its section 14 clause (1): "Retailers or street vendors shall not sell or provide commodities to consumer in carry bags or plastic sheet or multilayered packaging, which are not manufactured and labelled or marked, as per section 11 prescribed under these rules". And as per its clause (2)-" Every retailers or street vendors selling or providing commodities in, plastic carry bags or multilayered packaging or plastic sheets or like or covers made of plastic sheets which are not manufactured or labelled or marked in accordance with these rules shall be liable to pay such fines as specified under the bye-laws of the urban local bodies."

FOREIGN COUNTRIES THAT HAVE SET EXAMPLES IN THIS REGARD

The ban in Bangladesh has led to a revival of the jute bag industry and other sustainable and bio-degradable alternatives in the country. Other countries have since moved to ban, discourage or promote the reuse of plastic bags, hundreds of billions of which are consumed each year.

Denmark and Ireland have both experimented with taxing plastic bags. Imposition of tax, imposed in Ireland, had reduced usage by more than 95%.Denmark employs a general waste tax that has proven to be very successful. The waste tax is differentiated so that it is most expensive to landfill waste, cheaper to incinerate it and tax-exempt to recycle it. It has been called a "green" tax on packaging and plastic bags.

In China about 2 billion plastic bags are used each day. To combat the growing problem of plastic bags in China, the government is planning to introduce a "bag tax" in a bid to help cut the demand for plastic bags and raise more money to tackle the pollution caused by the bags.

Taiwan has introduced a ban on the distribution of free single-use plastic bags by government agencies, schools and the military. The ban was expanded to include supermarkets and department stores, and to be applied later to street vendors.

In most of the European Countries manufacturers are required to collect back all plastic bags from society thus shifting responsibility on manufacturers than on State to make the process to function promptly.

SOME GENERAL SUGGESTIONS TO DEAL WITH PLASTIC PROBLEM AND TO IMPROVE THE WASTE MANAGEMENT RULE, 2015 SO AS TO MAKE IT EFFECTIVE IN TRUE REGARD

1) The laws requiring these manufactures to install anti-pollution machinery at their premises is not being strictly adhered to by these people. Thus just making a stricter rule is not going to compel them to abide by the rule unless skilled and effective enforcement machinery is established which could act as proactive watchdog and could vet the activities of these industries and manufacturing units quite meticulously.
2) Currently the object of the rule appears to be "where the plastic material goes after use" and it needs to be changed to "where the plastic material comes from" thus nipping the problem in the bud itself.
3) Establishing machineries at centre and state level are not at all sufficient and this is manifested by the ineffective enforcement of various acts and rules which is already in operation as these people manage to elude the vigilance of these machineries thus the only way out is establishment of various watchdog machineries at lower level which can keep a constant vigil on the manufacturers and producers and anti-corruption departments have to be empowered to abate corruption in these machineries.
4) As per the Rule of 2015, punishment provision is to be made by *Urban Local Bodies* and punishment that they impose is too lenient to deter its contravention thus stricter punishment with strict enforcement machinery is need of the hour.
5) In India the quintessential cause of all pollutions esp. plastic pollution emanates from attitude of people towards it. Some people abhor this but due to ineffectiveness of proper machinery or otherwise do nothing, some do not see it as worth noticing and is inured to it and consider it to be part and parcel of the system itself, some due to unawareness adds to pollution and some desire to eradicate it but do not know what to do, thus unless people's attitude towards it is overhauled, the problem will never cease to exist. Thus, it is the combination of awareness and punishment that may work. Street vendors and retailers must often be raided to check whether they are abiding by the rule or not, nominal fine on consumers too must be levied because all information as to fines disseminate in common mass the fastest & people from old to young ones must be made aware as to the ill effect of it and not theoretical but practical knowledge must be imparted so that people could do on their own to deal with this problem.
6) A new waste management policy is gaining popularity in Europe because it saves tax payers money and is significantly better for the environment and public health. Extended Producer Responsibility (EPR) also called "Producer Takeback" is a product and waste management system in which manufacturers take the responsibility for environmentally safe management of their product when it is no longer useful or discarded. This is an absolutely essential policy whereby the producers of products must be made financially, physically and legally responsible for their products. The principle of "Extended producer responsibility" requires continuing accountability on producers over the entire life-cycle of their products. The aim of EPR is to encourage producers to prevent pollution and reduce resource and energy use at each stage of the product life cycle through changes in product design and technology. Producers will thus have a financial incentive to design their products with less hazardous and more recyclable material. The successful example of EPR implementation is in Germany

which shows reduction in consumption of packaging fell from 40% (by volume) to 27% by reducing the use of plastic packaging, significant design changes in the process and development of new technologies [10]. EPR (Extended Producer's Responsibility) in Plastic Waste (Management & Handling) Rules, 2015 is still loose & needs to be worked upon for better implementation of these rules. A clear directive of how EPR should be followed needs to be included therein.

7) A system must be devised where manufacturers must be mandated to collect back all plastic bags in the same manner as it happens in most of the countries Europe.
8) Plastic materials' use near water bodies be it lake, pond, river etc. must be totally prohibited as in present time plastic products have become a leading source of water pollution.
9) People must segregate the domestic waste products at their home itself, which helps municipal bodies to process the waste easily.
10) People must be encouraged to use cloth bags and paper bags for shopping.
11) There is staggering dearth of dustbins in cities and thus people throw their wastes on the road itself; especially it is very prevalent in small cities. Therefore our Government needs to install many more bins in cities. Moreover Municipal Corporation of different cities seem very lethargic and overburdened with respect to its burgeoning work load so Government of different states needs to rejuvenate its municipal corporation.
12) Scientific endeavours in this field must be highly supported by our government. In this relation following information is worth noticing: The IIP, a constituent lab of the Council of Scientific and Industrial Research, has for the first time in the country developed a technology to convert plastic waste into petroleum products. And, The Indian Oil Corporation Limited and the Department of Science and Technology are expected to establish India's first plant to convert waste plastic into petrol, diesel and LPG[11].
13) The establishment like Airport and Railways required to develop environmental friendly waste management system for disposal of plastic waste generated from their premises

CONCLUSION

Use of biodegradable and eco-friendly substitutes to Plastic carry bags besides creating awareness among the general public on the ill effects of indiscriminate use of plastic carry bags, the authorities should strictly implement the *' Plastic Waste (Management & Handling) Rules, 2015'* and encourage manufacture and use of qualified substitutes to plastic carry bags by way of granting subsidy to the manufacturers at least to begin with. The loss of revenue on this account may only be a fraction of the expenses incurred by the State and individual

[10] Report of CPCB on "Assessment of Plastic Waste and Its Management at Airports and Railway Stations in Delhi". Retrieved from http://cpcb.nic.in/upload/NewItems/NewItem_155_FINAL_RITE_REPORT.pdf

[11] Bharucha, E.(2004).Textbook of Environmental Studies for Undergraduate Courses. University Press (India) Pvt. Ltd

citizens on curbing the pollution of the environment and on maintaining sanitation, hygiene and health and curing the diseases caused as a result there of.

The Draft Rules need to be strengthened further. The main purpose should be to discourage the use of plastic in the country, but somehow the proper authorities and concerned incumbents have failed in the attempt to address this issue.EPR (Extended Producer's Responsibility) is still loose & needs to be worked upon for better implementation of these rules. A clear directive of how EPR should be followed needs to be included. The Penal provisions are weak and thus there should be inclusion of heavy penalty for non-compliance with the rules for effective implementation. But this conundrum will not be obviated unless every individual introspect as to how much he/she is adding to the problem and every individual should devise new ideas & take initiatives to abate the use of plastic materials in his/her daily life. On an individual level we can reduce the use of unnecessary items while shopping, buy items with minimal packaging, avoid buying disposable items and also avoid asking for plastic carry bags. Present time requires our introspection in which one needs to think about all the articles that one uses daily that are made from plastic, should make a list of those plastic articles and should ask oneself the following questions:

(1) How can you reduce the amount of plastic you use?

(2) What effects does plastic have on our environment?

(3) Where did the plastic come from/ how is it made?

(4) What happens to it when you throw it away/where does it go?

(5) Are we using 3Rs principle of reduce, reuse, recycle and proper waste disposal?