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Analysis of Plastic Havoc in India

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Excerpt of Modi Speech on 15 August 2019 about PLASTIC

"On October 2, let us pledge to make the country free of single-use plastic.On Diwali let us gift people cloth bags instead plastics. That will be an advertisement for your company as well," Modi on less plastic use. PM Modi also urged the startups to come up with ideas to recycle plastics in the country.

General Information about Plastic:-

Plastic is an essential component of many items, including water bottles, combs, and beverage containers.

Plastics can be divided into two major categories:

1. **Thermoset or thermosetting plastics**

Once cooled and hardened, these plastics retain their shapes and cannot return to their original form. They are hard and durable. Thermosets can be used for auto parts, aircraft parts and tyres. Examples include polyurethanes, polyesters, epoxy resins and phenolic resins.

2. **Thermoplastics**

Less rigid than thermosets, thermoplastics can soften upon heating and return to their original form. They are easily moulded and extruded into films, fibres and packaging. Examples include

polyethylene (PE), polypropylene (PP) and polyvinyl chloride (PVC). Let's look at some common plastics.

The types of thermoplastic include:

- **Polyethylene Terephthalate** (PETE or PET) – this plastic is one of the most commonly used on the planet example-all plastic bottles and containers. PET is well-known for spreading the poisonous antimony. According to a survey the antimony present in a water bottle is 100 times more than it is present in the groundwater level. People who have been exposed to antimony for a longer period of time have showed signs of respiratory distress and skin diseases.
- **High-Density Polyethylene (HDPE) –** It was first used for pipes in storm sewers, drains, and culverts. Today, this plastic is used for a wide variety of products. Like PET, it is also considered "safe," but has been shown to leach estrogenic chemicals dangerous to foeti and juveniles.
- **Polyvinyl Chloride (PVC) –** PVC is one of the oldest synthetic materials in industrial production. It has been called the "poison plastic" because it contains numerous toxins and is harmful to our health and the environment. Dioxins are formed when PVC is burnt. Dioxins are human carcinogens and are one of the harmful chemical substances that have been tested.
- **Low-Density Polyethylene (LDPE)** – LDPE was the first polyethylene to be produced, making it the godfather of the material. Packaging and containers made from LDPE make up about 56% of all plastic waste, 75% of which comes from residential households. LDPE is very difficult to recycle and has shown signs of releasing nonylphenol when exposed to sunlight.
- **Polypropylene (PP)** PP actually has a high heat tolerance and as such, does not seem to leach many of the chemicals other plastics do. E**xamples**include bottle tops, bottles, and fittings.

- **Polystyrene or Styrofoam (PS)** – Since polystyrene is lightweight and easy to form into plastic materials, it also breaks effortlessly, making it more harmful to the environment. Beaches all over the world are littered with pieces of polystyrene, endangering the health of marine animals. Polystyrene can leach styrene, a suspected carcinogen, especially in the presence of heat.
- **Miscellaneous plastics** (Includes: Polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon

Issue With Plastic:-

Newly published research calculates that ***across their lifecycle, plastics account for 3.8 per cent of global greenhouse gas emissions.*** That's ***almost double the emissions of the aviation sector***. If it were a country, the "Plastic Kingdom" would be the ***fifth-highest emitter in the world***.

Why worry about this?

Demand is set to rise, too. At 380m tonnes a year, we produce 190 timesmore plastic than we did in 1950. If the demand for plastic continues to grow at its current rate of four per cent a year, emissions from plastic production will reach 15 per cent of global emissions by 2050.

Plastic across the lifecycle:

More than 99 per cent of plastics are manufactured from petrochemicals, most commonly ***from petroleum and natural gas***. These raw materials are refined to form ethylene, propylene, butene, and other basic plastic building blocks, before being transported to manufacturers.

The production and transport of these resins requires an awful lot of energy — and therefore fuel. ***Greenhouse gas emissions also occur during the refining process itself*** — the "cracking" of larger hydrocarbons from petrochemicals into smaller ones suitable for making plastic releases carbon dioxide and methane.

Contribution to greenhouse emissions:

- According to the study, ***about 61% of total plastic greenhouse gas emissions comes from the resin production and transport stage***. A further 30 per cent is emitted at the product manufacturing stage. The vast majority of these emissions come from the ***energy required to power the plants that turn raw plastic materials into the bottles, bin bags and bicycle helmets we use today***. The remainder occurs as a result of chemical and manufacturing processes – for example, the production of plastic foams uses HFCs, particularly potent greenhouse gases.
- The remaining ***carbon footprint occurs when plastics are thrown away***. Incineration releases all of the stored carbon in the plastic into the atmosphere, as well as air pollutants such as dioxins, furans, mercury and polychlorinated biphenyls, which are toxic and damaging to human health.
- As plastics take centuries to degrade, disposal in landfill makes only a small contribution to emissions in theory. However, ***as much as 40 per cent of landfill waste is burnt in open skies, dramatically speeding up the release of otherwise locked-up carbon***.

Need of the hour:

- If we are to combat climate breakdown, reductions in plastic emissions are clearly needed. In showing that transitioning to ***a zero carbon energy system has the potential to reduce emissions from plastic by 51 per cent***, the study provides yet another reason to rapidly phase out fossil fuels.
- However, beyond urgently required global decarbonisation, we need to reduce our seemingly insatiable demand for carbon-based plastic. ***Increasing recycling rates is one simple way of doing this***.
- A more fundamental solution is ***to switch to making plastics from biodegradable sources*** such as wood, corn starch, and sugar cane. The materials themselves are carbon

neutral, although renewable power is essential to eliminate the climate impact of energy costs during production, transport and waste processing.

- Governments, corporations, and individuals must make research into alternatives a priority, and support alternatives to needless plastic waste.

Micro plastics and issues surrounding it

Micro-plastics are those super tiny beads (typically around 1 millimetre), that can be found in body and facial scrubs, as well as other personal care products.

Problems with micro plastics are:

1. **Cosmetic Plastic Exposure-** micro plastic can have hormone disrupting effects on the body, which can lead to thyroid problems, infertility, and an increased risk of cancer.
2. **Wildlife contamination-** Micro-plastics make their way into rivers, lakes, and oceans when discarded, polluting wildlife. It can have toxic consequences for animals, and can contaminate the fish we consume.
3. **Gingivitis-** Micro-beads in toothpastes can get trapped on the gum line, retaining bacteria and leading to gingivitis, gum disease, and other infections.
4. **Contaminated sea salt-** Micro-plastics can make their way into sea salt found in grocery stores, adding to the plastic body burden.

Not only they are chemical particles that come in close contact with your skin, which can absorb toxins, but they also create huge problems for wildlife, fish, and the environment.

Magnitude of the problem in India

- The per capita consumption in India is still low compared to more developed countries. According FICCI, Indians consume 11 kg of plastic per year in comparison to 109 kg by an average American. But this figure is estimated to rise in the coming years. To avert a crisis would require vision, political will and the nerve to pull off a balancing act.

- India alone generates about 4354 tonnes of plastic waste every day.
- Even though there is a complete ban on coloured polythene bags in India, one can find them in abundance in almost every part of the country.

The Plastic Waste Management Rules, 2016

These rules aim to:

- Increase minimum thickness of plastic carry bags from 40 to 50 microns and stipulate minimum thickness of 50 micron for plastic sheets also to facilitate collection and recycle of plastic waste
- Expand the jurisdiction of applicability from the municipal area to rural areas, because plastic has reached rural areas also
- To bring in the responsibilities of producers and generators, both in plastic waste management system and to introduce collect back system of plastic waste by the producers/brand owners, as per extended producers responsibility
- To introduce collection of plastic waste management fee through pre-registration of the producers, importers of plastic carry bags/multilayered packaging and vendors selling the same for establishing the waste management system
- To promote use of plastic waste for road construction as per Indian Road Congress guidelines or energy recovery, or waste to oil etc. for gainful utilization of waste and also address the waste disposal issue; to entrust more responsibility on waste generators, namely payment of user charge as prescribed by local authority, collection and handing over of waste by the institutional generator, event organizers.
- An eco-friendly product, which is a complete substitute of the plastic in all uses, has not been found till date. In the absence of a suitable alternative, it is impractical and undesirable to impose a blanket ban on the use of plastic all over the country. The real challenge is to improve plastic waste management systems.

The Plastic Waste Management (Amendment) Rules, 2018

- The amended Rules lay down that the phasing out of **Multilayered Plastic (MLP)** is now applicable to MLP, which are "non-recyclable, or non-energy recoverable, or with no alternate use."
- The amended Rules also prescribe a **central registration system for the registration of the producer/importer/brand owner.**
- The Rules also lay down that any mechanism for the registration should be automated and should take into account ease of doing business for producers, recyclers and manufacturers.
- **The centralized registration system will be evolved by Central Pollution Control Board (CPCB)** for the registration of the producer/importer/brand owner. While a national registry has been prescribed for producers with presence in more than two states, a state-level registration has been prescribed for smaller producers/brand owners operating within one or two states.

Environment day theme of 2018 year and its importance

- India was the global host of 2018 World Environment Day.
- With "**Beat Plastic Pollution"** as the theme for 2018 edition, the world is coming together to combat single-use plastic pollution.
- "Beat Plastic Pollution", the theme for World Environment 2018, urges governments, industry, communities and individuals to come together and explore sustainable alternatives and urgently reduce the production and excessive use of single-use plastic polluting our oceans, damaging marine life and threatening human health.

Solutions

- **Waste-to-energy (WTE) plants** that incinerate municipal wastes to produce energy have been hailed as a solution to the gargantuan problem. Apart from several state and city-

level governments, the Centre also plans to invest in 100 such plants by 2020. But such plants would contribute to air pollution, besides derailing plastic waste management efforts.

Since India's waste has high organic content, its calorific value is typically lower than what is required to run WTE plants. In other words, to make **WTE plants** effective, plastic content with higher calorific values has to be increased in the municipal waste.

- **Substitution of plastic with other biodegradable materials** such as reused cotton or paper.
- **Bio plastics are an emerging alternative to plastics but only 2% of global plastic production is bio-based.**

What is Bio Plastic?

- Bio-plastics mean that these plastics are biodegradable.
- Unlike conventional plastics, these items can be broken down by microbes in industrial composting facilities within six months.
- This makes them a promising, if partial, solution to India's plastic problem.

What are the raw materials used to manufacture?

- Bio-plastics can be made out of dozens of different feed stocks.
- Polylactic acid is one of the commonest bio-plastics in use (PLA).
- PLA is extracted from food crops starch like corn and cassava.
- This PLA is then imported by Indian companies, who blend it with other ingredients to make carry bags, bin liners or cutlery.
- Polyhydroxyalkanoates, or PHA, is another feedstock that is synthesized by having bacteria feed on vegetable oils or sugars from food crops.

What are the challenges and concerns regarding Bio-plastics?

- The obvious **roadblock** in the way of bio-plastics fulfilling their eco-friendly purpose is that most of them require industrial composting facilities to be disposed of.
- But most cities lack an adequate number of such facilities.
- This means the bio-plastics end up on the streets, harm the environment and defeat its very purpose of tackling plastic pollution.

What are the major concerns in expanding the market for and manufacturing bio-plastic?

- **Customers -** The **big challenge** for the firms manufacturing bio-plastics is in finding customers.
- The main reason is that **they are expensive** because most bio-plastics produced globally are made from the byproducts of food crops.
- Compared to conventional plastics, which are derived from fossil fuels, a bio-plastic carry bag could cost almost thrice as much.
- With only a few municipal corporations implementing the 2016 countrywide ban on conventional plastic carry bags of less than 50 micron thickness, there has been no economic reason for most people to switch.
- **Raw material -** The reliance on food crops itself presents a key challenge for bioplastics, because these crops are simply not a cost-competitive alternative to fossil fuels.
- PLA cost €2 per kg in 2016, conventional low-density polyethylene (LDPE) cost between €1,250 — 1,450 per tonne (1,000 kg) that year.
- If food crops are already a costly way to make plastics, throw in the fact that almost all raw material for bioplastics, like PLA pellets, is imported by Indian manufacturers today.
- China is also a huge seller of compostable plastics.

- This means that import duties and transport costs get tacked on to the already high feedstock prices.

What can be the factors that will make the manufacturing of bio-plastic a win-win situation for the producers and environment?

- Indian firms manufacturing raw material locally in the coming years, which would reduce the price difference between bio-plastics and conventional plastics.
- Internationally, too, a wave of innovation is expected to drive down raw material costs.
- The most important innovation is the use of non-food crops.
- For example, the U.S.-based Company has developed an inexpensive method to use biomass willow plants, switch grass, and sawdust as raw material.
- Another American company has developed a technology to synthesize PLA from organic mixed-waste.
- Such innovations will drive expansion of the global bio-plastics industry from 4.2 million tonnes to 6.1 million tons in 2021.

What can India do in this regard?

- Much of the innovation in this field is being driven by policy, such as the European Union's 2015 action plan towards a circular economy.
- The high cost and technological barriers are the major roadblocks for the bio-plastics industry.
- This means that if India needs its own policy framework.
- Subsidies for electricity consumption, lower rates of Goods and Services Tax and lower import duties can aid the manufacturers. ".
- Municipal authorities have a big role to play too.
- They must set up composting infrastructure and impose bans more stringently.

- This will push up demand, a critical driver for efficiency in the industry.
- Small nudges could lead to big cost savings, because some bioplastic applications inherently need less material.
- For example: Mulch films— large sheets of conventional plastics spread on farms to conserve water and suppress weeds.
- Conventional plastic films are typically thick to allow farmers to peel them off after use.
- But bio-plastic films can be thin if they can break down in place, Further; not having to peel off the film can save on labor costs.

Is bio-plastic a silver bullet to all our plastic pollution related problems?

- Bio-plastics, while useful, are no panacea for pollution.
- This is because the key issue at present is the lack of awareness among people, who don't segregate their waste.
- A large amount of the discarded plastic wouldn't be an environmental hazard in the first place, if it were properly recycled.
- With most bio-plastics, degradation is fast in industrial composting facilities, but takes years in the natural environment.