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Waste Management and Circular Economy

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Cleanliness is next to godliness
-Mahatma Gandhi

Creating waste is byproduct of ever evolving civilization .due to globalisation and consumerism our management of waste products has been very dismal somewhat alarming.India annually produces 62metric tonnes of waste of which only15present is recycled.Presently in India, about 960 million tonnes of solid waste is being generated annually as by-products during industrial, mining, municipal, agricultural and other processes. Of this 350 million tonnes are organic wastes from agricultural sources; 290 million tonnes are inorganic waste of industrial and mining sectors and 4.5 million tonnes are hazardous in nature.
However, it's not the amount of waste generated that's as much of an issue as the fact that more than 45 million tonnes, or 3 million trucks worth, of garbage is untreated and disposed of by municipal authorities everyday in an unhygienic manner leading to health issues and environmental degradation.

Only 68% of the garbage generated in the country is collected, of which 28% is treated by the municipal authorities. Thus, the poor collection and treatment of waste leads to dumped garbage on streets clearly showing up the poor and inefficient system available to tackle waste management in urban areas. If this issue is not tackled efficiently and better policies and practices for waste management are not adopted, the total waste generation is projected to be 165 million tonnes by 2031 and 436 million tonnes by 2050.
In India,55 mt waste is being generated by 377 million urban population.population is expected to grow 600million by 2030 and municipal waste is expected to grow to 165 mt annually by 2030.

An analysis by MoHUA identifies significant potential for resource recovery from these waste byproducts through circular economy.
For example, dry waste recycling has a potential to generate approximately Rs 11,836 crores per annum, and compost and Bio- CNG from wet waste can generate revenues of nearly Rs 365 crores and Rs 1,679 crores per annum respectively.
Waste is part of the economy – it is a by-product of economic activity, by businesses, government and households.

Waste is also an input to economic activity – whether through material or energy recovery.Economics provides a framework in which to think about when intervention by Government might be desirable, as well as what type of policy intervention is appropriate.WASTE management as a sector involves various activities, viz. collection, transportation. processing and disposal.Each activity involves various COST AND BENEFITS. In the conventional valuation, certain hidden costs are ignored, making the valuation process incomplete.

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Municipal waste can be characterised into five broad categories namely;
1)Dry waste
2)Wet waste
3) Construction and demolition waste
4) waste water
5) sludge waste

1) **DRY WASTE**-

Dry waste consists of paper, plastic, rubber ,glass,metals,non-recyclables etc.This waste has high economic value as it is recyclable, owing to greater pace of urbanization and changing consumption pattern along with use and throw culture have led to growing municipal waste.India currently generates approximately 1.45 lakh metric tonnes of solid waste, 35% of which is dry waste. Thanks to India's informal sector, a majority of the plastic waste is recycled.
India has a very low recycling rate.It can take inspiration from countries like Germany (66%), Singapore (61%)and south korea (59%) who have greater waste recycling. India consumes lesser than global average of plastic good .

2) **Wet waste**-

Wet wastes are generally biodegradable.It is also known as Organic waste.wet waste are composed of kitchen waste, market waste (vegetables,meat, fruit and flowers),and horticulture etc.These are 50% of municipal solid waste.They almost immediately starts decomposing with the help of moisture, temperature, micro-organisms etc.
These wet waste has to decompose properly otherwise if left open or in landfills ,it will become a major source of air,water and soil pollution because of green house gases emissions.

3) **Construction and demolition waste** -

India is a fast growing developing country with large potential and requirements of infrastructure projects.A lot of construction and demolition activities are taking place which also contributes to the pollution and waste.C&D waste comprises building materials, debris,rubbles generated during construction.It can be categorised into concrete,soil, steel, plastic ,glass etc.
India currently produce 12mt of C&D waste which varies from cities to cities.If done scientifically and efficiently almost 90% of C&D waste can be recycled . International best practices can be adopted for eg. UK 90%, USA 70%,and France 48%are leading in C&D recycling.In India,C&D waste is sent to landfills or get mixed up with municipal solid waste and complicate the disposal.

4) **waste water or sewage** -

India is going to be a water stressed country with metropolitan cities facing shortage of water.Currently urban India generates 72,368 MLD of municipal sewage which is estimated to increase to 1,20,000 MLD by 2050.Untreated waste water is source of deseases , unpleasant environment and end up in rivers and thus polluting marine ecosystem.

5) **Sludge waste** -

The residue that accumulates in sewage treatment plants is called sludge (or biosolids). Sewage sludge is the solid, semisolid, or slurry residual material that is produced as a by-

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product of wastewater treatment processes. This residue is commonly classified as primary and secondary sludge. Sludge contain a number of nutrients which are beneficial to crops.India didn't pay attention to sewage sludge treatment considering a secondary issue compared to main wastewater treatment. However, things are changing as importance of sludge management, is on the rise due to the fast increase of sludge generation owing to sewage networkextensions, new installations, and upgrading of facilities. United States, Europe and East Asia are leaders in sludge utilisation.

CIRCULAR ECONOMY

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. This is a departure from the traditional, linear economic model, which is based on a take-make-consume-waste pattern. In recent times the idea of circular economy is gaining traction because it proposes solutions to the most pressing issues related to sustainable development challenges like waste circular economy is based on 3 principles 1) minimal waste and pollution, 2) circulate products and materials at their highest value, 3) Regenerate nature.
In a circular economy, waste is minimized. Products and raw materials are designed to be reused as long and intensive as possible over and over again. Waste is the new raw material.
According to the Circularity Gap Report 2020, the global economy is only 8.6% circular. This means that over 90% of the resources that enter the economy (100 billion tonnes per year) are wasted.

BENEFITS OF CIRCULAR ECONOMY

1) Protection of natural environment
2) Beneficial to local economy
3) promote growth
4) Promote self-sufficiency

RECOMMENDATIONS -

NITI AAYOG has made some very important recommendations regarding management of solid waste with special focus on 3 sub categories of MSW.

1)**Dry waste**
•Inclusion of dry waste in EXTENDED PRODUCERS RESPONSIBILITY (EPRs) in allignment with polluters pay principal.
•Mandatory 25% recycled products in non food grade packaging.
•Mandating of cement kilns to use 25% of non recyclable combustible dry waste in place of coal.
•Mandating use of mono-polimers in production of packaging products i.e. PET bottle with HDPE covers.
2**)Wet waste**-
•Incentivizing biogas plants
• Incentivizing by-products and tag sale with chemical fertilizers.
• promoting biomethanation.

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3) **Construction and demolition waste**
•To reduse virgin materials use in construction i.e.20% in building construction and 40% in road and highways making.
•govts. to provide tax rebate for use of secondary materials use.
•no green tax on C&D materials reuse, transport.
•mandatory use of certain proportion of C&D materials reuse in public infrastructure.

4) **Waste-water**
•Preparation of new standards for designated reuse of the treated wastewater and guidelines for the reuse.
•Mandating use of recycled water in thermal power plants located within 50 km of ULBs.

5) **Sludge**
•to make a national policy on municipal sludge recycle and reuse.
•Incentivise fertilizers and byproducts tagged with recycled sludge.
•Imposing tax/ fine on dumping sludge in landfills/ open land.

Conclusion

The introduction of Swachh Bharat Mission,
rooted in the 3R principles,was a major step in this direction, where, for the first time,the issue of waste management on a Mission mode was brought to the centre of the nation's development agenda. Parallelly, the promulgation of the SWM Rules 2016,Plastic Waste Management Rules 2016,National Fecal Sludge and Septage Management Policy 2017 etc. have helped to further strengthen this focus and realign the country's commitment to a greener environment and zero-waste future.

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