**International Journal of Research inSocial Science**
Vol. 12 Issue 03, March 2022,
ISSN: 2249-2496 Impact Factor: 7.081
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

# SOLID WASTE MANAGEMENT IN INDIA - SOME ISSUES AND CHALLENGES

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**ABSTRACT**

The human being has been the only specie on the earth that can act and react, innovate and also cause detriments to the environment. The ever increasing population, industrial growth, urbanization and unresolved desires are causing impediments to the continuity of life. Solid waste can be segregated as organic, inorganic and recyclable. Increasing quantities of waste, unawareness of public and irresponsibility of officials concerned, lack of strategic planning, lack of infrastructure, improper transportation, processing and disposal facilities along with institutional flaws and political determination are the barriers in SWM imposing their devastating impact on the living beings. SWM includes social and economic costs. Union Ministry of EF&CC and ULBs are responsible for administering MSW in India. Government has to recognize services of persons from informal sector and private persons who play an important role in controlling waste. Waste is a potential resource as it could be converted into energy and provide livelihood for many people. The Government of India had launched Swachh Bharat Mission to create a 'Clean India' eliminating open defecation and JNNURM to provide access to utilities to the urban poor. Governments at various timings enacted different rules and regulations and Courts in India have taken initiative in enforcing laws related to environment. The Government has to mull PPP in waste management. The present article is about SWM incorporating related issues and observations of researcher. It is concluded that Governments, informal sector and community should conjunct initiative in the development of an organized system of waste management.

**Key words:** population, solid waste management (SWM), informal sector, laws, infrastructure, waste resource, PPP, Swachh Bharat Mission, JNNURM

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## INTRODUCTION

Earth is one of the planets on which a living being can continue to exist but not yet known whether other planets are suitable for living. On this plant GOD has created four kinds of species and 22 lakh varieties in each kind ie: on total 84 lakh varieties of species and one of them is human being. This human being can act and react, use language and communicate, innovate and do incredible and out of over excitement, can also perform such activities which are detrimental to the environment.

**A) Population expansion and tribulations:** The population of India is expected to increase from 121.1 crores in 2011 to 152.2 crores in 2036, an increase of 25.7 percent in 25 years, resulting in an increase in density from 368 to 463 persons per square kilometer[1]. The increasing population is not a problem but how better this resource is being utilized and people endure is the question. Rising incomes, rapidly growing but unstrategic urbanization, migration of villagers to cities for better and convenient employment, conversion of living areas into concrete jungles and underdevelopment of infrastructure are resulting in increased volumes, composition and characteristics of solid waste especially of non-biodegradable nature. Industrial growth, technological advancements and urbanization have stretched the outlook of possibilities of mankind causing inexorable environmental tribulations like deforestation, soil erosion, and pollution impeding development and piloting exodus in rural India; these problems are causing sprain on the municipal services and personnel and injuring environment and public health significantly.

**B) Solid Waste:** Solid waste consists of highly assorted mass of discarded materials from commercial, industrial, agricultural and mining activities labeling them as municipal, industrial and hazardous based on their origin and composition. Solid waste can be separated into three kinds: (i) biodegradable or organic, like food and kitchen waste, green waste vegetables, flora, leaves, fruits and paper, etc., (ii) inert or non-biodegradable, like construction and demolition waste, dirt, debris, etc. and (iii) recyclable, like plastic, paper, bottles, glasses, etc. It is well known that the cities are huge contributors of Municipal Solid Waste (MSW) generally consisting of non-hazardous components but sometimes hazardous too such as product packaging, waste fabric, goblet and metal, paper, paints, batteries, industrial filth, dead animals, medical debris, insulations, conduits and including sewage and sludge comprising all toxic wastewater and night soils etc[2].

**C) Causes of pollution and waste:** Air pollution is mainly caused by vehicles contributing 64 percent, 16 percent by thermal power plants, 13 percent by industries and seven percent by domestic sector. This necessitates the importance of scientific SWM in

today's context. The inability of segregation of solid waste, ineffective functioning of biomethanation plants, safe transportation of waste to energy plants with no emission of toxic pollutants, over dumping of landfills, financial sustainability of the system are posing challenges in waste management. Due to non-biodegradability, inorganic waste remains in the environment for years and it is unsafe to the health of all the living beings, since toxic chemicals percolate into the soil and contaminate the underground water as well. City dumping yards are left away with a set of insufficient treatment facilities[3]. Open defecation is deeply rooted among the people, a practice transferred for generations including other reasons like poverty and landlessness. Unsystematic consumerism followed by developed countries has created unnecessary demand followed by waste generation.

**D) Quantity of Waste:** According to the "Swachhata Sandesh Newsletter" issued by the MoHUA, 147,613 MT of solid waste was generated per day from 84,475 wards as of January 2020. The 2014 report of "Task Force on Waste to Energy," issued by the Planning Commission estimates that urban India would generate 2,76,342 tonnes per day (TPD) of waste by 2021; 4,50,132 TPD by 2031; and 11,95,000 TPD by the year 2050 with a per capita waste generation of 450 grams per day, at a rate of 1.3 percent increase per annum[4]. As much as 3.3 MMT of plastic waste was generated in India in 2018-19, (CPCB report 2018-19) ie: 9,200 TPD. Reports mention that urban India had generated 31.6 MT of construction waste in 2001 and is currently generating 47.3 MT and by 2041, it is predicted to be 161 MT, a five times increase in four decades. India had generated 3.2MT of e-waste in 2019 but details of 90 per cent of this waste were not entered into documents.

During 2019-20, about 8.78 Million Metric Tonnes (MMTs) of hazardous had been generated by 69308 hazardous waste generating units in India out of which 4.18 MMT was utilizable (47.60 percent), 2.13 MMT landfillable (24.29 percent), 2.07 recyclable (23.59 percent) and 0.40 MMT incinerable (4.52 percent). Gujarat state stands at the top with 28.30 percent and Maharashtra second with 11.38 percent in generating hazardous wastes[5]. The quantity of waste recycled or utilized was 5.26 MMT and 3.23 MMT was disposed. India has 382 other waste recyclers with an authorized capacity of 6054548 MT and 1547356 MT of waste was recycled or utilized during the year.

**E) Impact of Solid Waste:** Water streams suffer high levels of pollution from waste at an estimated 75 percent generated from untreated municipal sewages and 50 percent from industrial units (Report submitted on Environmental Compliance and

Enforcement in India: Rapid Assessment in 2006). The MSW ranges from 100 to 500 grams per person respectively in small and large towns containing only 13 to 20 percent recyclable content. Dumping of garbage without any treatment for 20 years with 10 meters height would require 66000 hectares of landfills. Increasing volumes of lifeless materials like synthetic bags, water bottles and packing material, gadgets and equipment, methane emissions from food waste, toxic chemical leaks from e-waste and unearthing natural resources, untreated for months lying at dumpsites and landfills have also resulted in increasing waste and its devastating impact on marine life. We can observe mammals and aquarian animals eating this inorganic waste, become ill healthy causing choke appetite obstructing esophagus, and humans suffering from diseases like tumors, cancer, asthama, skin allergy and other bacterial infections, throat infections from the smoke and bad smell the waste releasing into the air. The non-segregation of waste is leading to air pollution though new technologies have emerged for processing non-biodegradable waste into energy. Absence of proper clearance of grey water or improper sanitation facilities leads to diarrhea, malaria, dengue, cholera. Women and girls are badly affected, girls stop going to school due to lack of wash rooms.

**SWM ACTIVITIES:** MSW activities include waste collection for households, and transportation of waste to waste management facilities, waste processing and disposal at waste management facilities, any sale of by-products. Four primary SWM paths are recycling, composting, and waste-to-energy and land disposal.

**A) Management costs of MSW:** MSW management costs include cost incurred on public awareness, land acquisition, price of vehicles, operation and maintenance of vehicles and landfills, environmental degradation and unexpected costs during natural calamities and remedial measures, effects on property values, community image and quality of life, wages payable to workers, health and retirement benefits, insurance. Cost of vehicles and equipment comprise like common dumpers, storage bins, tricycles, motor vans, tractors and tippers, storage equipment like containers, portable compactors, hook lift systems, hoppers. The Urban Local Bodies (ULBs) spend between Rs.500 and Rs.1500 per ton on SWM, containing 60 to 70 percent on collection alone, 20 to 30 percent on transportation and less than five percent on treatment and disposal. (Guidelines, 12$^{th}$ Finance Commission Grants).

**B) Transportation of waste:** Many cities lack proper transport facilities to carry waste. The ULBs are using tricycles and motor vehicles with hydraulic tipping containers

depending on the quantity to be carried. The collection process of waste begin with contractors employed by local Government bodies; they perform the activity of collecting waste door-to-door and transport to landfills after separating the recyclable items to fetch some money.

**C) Processing, treatment and disposal of waste:** India is adopting processing technologies like composting, biomethanation, recycling, refuse-derived fuel, incineration, pyrolysis, waste-to-wealth and waste-to-energy depending on the kind and quantity of waste, availability of funds and capital investment, cost recovery, land availability and environmental sensitivity to locations.

**Each State may follow the waste management policy (hierarchy) as under:**[6]

(i) Waste prevention or minimization

(ii) Waste utilization

(iii) Waste recycling

(iv) Waste processing

(v) Waste-to-Energy

(vi) Landfilling

## RESPONSIBILITIES

No individual has apprehended or no city has comprehended a holistic solution to confront the problem of waste management. The awareness of each individual in separating organic from non-biodegradable waste and the concerned officials in collecting the segregated waste and moving it to the dump yards, processing, recycling and disposal is still in embryonic stage and this is causing in air and water pollutions and land is becoming uncultivable losing its fertility. The mindset of most of the Indians can't understand and current systems in the country cannot muddle through the impacts on the environment and public health.

The Union Ministry of Environment, Forests and Climate Change (MoEF&CC) is responsible for regulating and managing environmental activities in India. According to the 12$^{th}$ Schedule of the 74th Constitution Amendment Act of 1992, ULBs are responsible for keeping cities and towns clean and are accountable for administering MSW in India. The need for digitalization in waste collection and disposal operations goes beyond information technology creating improved data quality and better insights into waste streams during operations[7].

## GENERAL OBSERVATIONS

Segregation of solid waste into wet and dry, organic and inorganic is not observed at household or factory level though containers are provided by the local authorities; the waste is being handed over to the Safaiwala in polythene bags and drums. The vendors throw away the rotten vegetables and fruits decomposed in the markets to any corner though they are provided with big containers, vehicles run over them making marks on the roads or mammals eat them. Public throw empty ice cream cups and sachets behind the trees in parks creating irritation to other visitors, paper plates and plastic items used in events and coconut shells in drainage barricading the waste water flow, water bottles and carry bags under seats or in wash basins thinking it's the duty of the service provider to clean. Wastage at slaughter house and other wastes get combined with solid waste; even it is carried in vehicles not covered, emitting fusty smell all through the way. Slashed trees are thrown in open places. We can see dogs and cattle at the dump yards removing and carrying the waste, leaving it somewhere in the residential areas. Synthetic tumblers, thermoplastic plates, paper cups have replaced banana leaves and steel and glass tumblers in events; these will be carried to the dump yards and burnt up. It can be seen waste-pickers carrying plastic, rusted iron, polythene items in bags on their shoulders.

## ROLE OF INFORMAL SECTOR IN WASTE MANAGEMENT

Extensive involvement of informal sector like waste pickers and scrap buyers play an important role in controlling and segregation of organic and inorganic waste before carrying the waste to dump yards and landfills. The informal sector is symbolized by small-scale, labour-intensive, largely unregulated and unregistered low-technology manufacturing or provision of materials and services. Pickers extract potential value from both commercial and industrial waste taken from bins, trucks, streets, waterways and dumpsites and also usable materials to other enterprises. They collect organic waste usable for composting and biogas generation making a significant contribution in keeping cities clean. During 2019-20, 50,752 MT of hazardous waste was collected throughout the country by the waste collectors and 43,379 MT was sent to common Treatment, Storage and Disposal Facility (TSDF) for disposal. Waste picking is the only source of income for their families and for significant number of urban poor, despite the associated health and social issues. Some of them work in recycling plants owned by cooperatives or waste picker associations and are even unaware of their rights; they work without wearing gloves or masks and also live nearer to the e-waste dumps.

We can observe on the roads, on the railway tracks and landfills, children collecting plastic bottles, iron particles using magnets, papers and other garbage; The health condition of these children living in unhygienic environments, succumbing to malnutrition, extreme poverty not wearing gloves, shoes or masks is at severe risk. Landfills emit methane that is approximately 21 times as potent as carbon dioxide (OECD); continuous flow of toxic leachate makes dump-yards vulnerable to the waste-pickers and their families.

**BARRIERS TO WASTE MANAGEMENT**

Major barriers in achieving effective SWM in India generally are lack of strategic MSW plans and the Government finance regulatory framework, public unconsciousness. ULBs have financial muscles that are scarce to cover the costs coupled with collection, storage, treatment and disposal of waste, have inadequate infrastructure, and face institutional flaws and lack of political determination. There has been technological advancement in processing, treatment and disposal of solid waste. Energy-from-waste is a crucial element of SWM but many of the waste-to-energy plants are not operating to their full potential due to lack of improper financial allocations. Most recyclable waste ends up with dumping. The contractor instead of taking the waste to the landfill, dump it into any vacant plots for saving transportation costs. India is lacking qualified engineers and environmental professionals in the improved waste management system, though the potency of energy generation from waste provides business opportunity and also livelihood to many people. The competence to plan and manage the system and ensure the imposing of the rules is a major challenge. Waste management rules in India are based on the three principles namely "sustainable development", "precaution" and "polluter pays" mandating municipalities and commercial establishments to act in an environmentally accountable and responsible manner restoring balance.

**A) Burning:** Burning garbage leads to greenhouse emission, affects humans and animals health, pollutes water, food and land loses its fertility by the supply of contaminated water. Burnings release carbon monoxide, nitrogen oxide, sulphur dioxide, and carcinogenic hydrocarbons, apart from particulate matter into the air. The entire food chain will be affected by the contaminated water through the leachate from the rotten garbage.

**B) Waste resource:** As per the report by IIT Kanpur (2006) at least 15 per cent or 15,000 MT of waste generated every day in the country could be recovered and would also

provide employment to about 5,00,000 rag-pickers[8]. The quantity, characteristics and forecasts of solid waste in India depends on the living standards, activities and habits of the people in that area. High income groups use more packaged products resulting in the waste in form of plastic, paper and textiles. Compostable organics include all the eatables. Most of the organic waste is generated from households, and inert waste from construction, demolition of buildings and road sweeping.

## INVESTMENT REQUIREMENTS

**A) Urban Infrastructure:** Land is required for dumping and landfilling, tipping area, pre-processing area, compost pad area, compost refinement, administrative area and lab area and these depend on the size and composition of waste, size of the population, distance of transportation. Vehicles needed at a sanitary landfill are bulldozers, loaders, compactors, water tankers and tractors and tippers. The current levels of investment into urban infrastructure in India low compared to the fund requirements. The investment needed for development of waste landfill include cost of site acquisition if the site belongs to private persons, construction of compound wall, engineering cost, environment impact assessment cost, site development for waste treatment, construction of underground sewages, environment monitoring, construction of approach roads, electricity, cleaning of vehicles, fire engines and extinguishers, cost of separating waste compositions, equipment in workshops, garages and labs, sign boards. The India Infrastructure Report presented by Rakesh Mohan in 1996 observes that investments in core urban services including water supply, sanitation and SWM were considerably inadequate. Suitable management of information system could ensure efficient monitoring and assessment like tracking vehicle movements, minimizing human intervention and health hazards and make possible of providing enhanced services to the general public.

**B) Cost Planning for SWM:** The approaches used to estimate costs of SWM are broadly classified into three categories i) the unit cost method, ii) benchmarking techniques and iii) developing cost models using sub-approaches such as cost and production function analysis[9].

**C) Digitalizing Waste Management:** Suitable management of information system could ensure efficient monitoring and assessment like tracking vehicle movements, minimizing human intervention and health hazards and make possible of providing enhanced services to the general public. The digitilising system has wider scope for investments.

**SWACHH BHARAT MISSION (URBAN)**

The Swachh Bharat Mission (SBM) was launched on 2nd October 2014 for five years by the Indian Government, aiming to create a 'Clean India' eliminating open defecation by providing sanitation facilities and creating awareness amongst all sections of the society encouraging their participation in healthy sanitation. Toilets built since 2nd October 2014 was 1083.06 lakhs with 61.24 percent increase in households with toilet. 8.37 lakhs toilets were built during 2021-22 and 711 districts were declared as open defecation free. It creates employment generation in waste management activities of segregation, reuse and recycling). Presently the mission is moving towards its second phase of ODF-Plus reinforcing for the safe management of solid and waste in villages.

**JNNURM**

One of the mission objectives of JNNURM is scaling up delivery and highlighting the access of amenities and utilities like water supply, sewerage, drainage and SWM to the urban poor and re-development of areas of old cities to reduce overcrowding. The PPP models in SWM under JNNURM allow private equity upto 30 percent and the balance is provided by the Central and State Governments.

**SUSTAINABLE DEVELOPMENT GOALS AND WASTE MANAGEMENT**

In the 2030 Agenda for Sustainable Development 'Transforming Our World', goals were set and it was decided to make to reduce the adverse per capita environmental impact of air quality and other waste management. Members have agreed to reduce global food waste at retail and consumer levels and food losses at production and supply chains, management of chemicals and minimize their adverse brunt on environment, achieve access to adequate sanitation, improve water quality[10]. The overall goal of SWM is to collect, treat and dispose solid waste generated in metros and urban areas to cause least environmental damage, in a socially acceptable manner, and most economically (World Bank, 2001)[11]. Properly engineered waste disposal protects public health and preserves quality of key environmental resources, allows the safe disposal of residual MSW on land, protects ground and surface water from pollution fire hazards, problems with animals, birds and reduces greenhouse gas emissions.

**A) Funds requirement:** The estimated requirement of funds by the Central Public Health & Environmental Engineering Organisation (CPHEEO) for 100 percent coverage of urban population under safe water supply and sanitation services by the year 2021 was Rs.1,729 billion. Municipalities in smaller towns spend up to 70 percent of their budget on

SWM and metropolitan cities spend around 10 percent and most of the urban centres spend upto 40 percent.

**B) Market value of waste:** The market value (MV) of plastic packaging industry crossways India was approximately US $15 bn during 2010 and was estimated to be around $72 bn during 2020 (Ian Tiseo, Oct 4, 2021, Statista). It is projected that the revenue of waste collection, treatment and disposal activities and materials recovery will amount to approximately $3.5 bn by 2024 (Oliver Silveti Sánchez García, , Sep 30, 2021, Statista).

**C) Conversion into energy:** Public and Government have to recognize that wastes are potential resources and effective waste management with value extraction from waste could provide livelihood for many people; this transmission from waste to resource could happen through investment in SWM infrastructure.

**i)** PPE contains polypropylene can be converted into petrol by the process of pyrolysis which breaks down plastic without oxygen. According to CPCB, after February 2020, around 1,500 producers were provided EPR, and there are only 34 registered PROs. The renewable municipal waste capacity in India was approximately 165 megawatts in 2019 scaling up to 188 megawatts in 2020. As of December 2019, about 26 ‘waste to electricity’ plants were functional across India and about 1.5 thousand centralized ‘waste to compost’ plants for converting segregated organic waste that is biodegradable to nutrient rich compost (Ian Tiseo, Oct 4, 2021, Statista)

**ii)** Waste processes through bio-methanisation produces biogas containing 55 to 60 percent methane which can be used as fuel for power generation, and composting of waste through aerobic or vermin-composting methods is used for growing vegetables and plants. Animal Dung could be utilized in generating clean cooking fuel and also bio fertilizer through the process of anaerobic digestion. 992 MMT of animal dung can save Rs.444 bn spent on LPG consumption in one year and bio slurry equal to 44 percent of nation’s NPK (nitrogen, phosphorus, potassium) requirements amounting to about Rs.425 Bn.

**iii)** Biomass is chopped and is mixed with the slurry of the biogas digester as a feedstock for briquette used as fuel for cooking and also used in gasifier for converting into syngas to generate electricity. The ash of briquette added to cement can be used in brick making. The plasma gasification process of converting polymer waste and sanitary items also works in the above process of electricity generation.

**iv)** The construction and demolition waste crushed is used as an aggregate in PCC road making. According to the CPCB, India has 312 registered E-waste recyclers with a capacity to handle 782,080.62 tonnes of E-waste every year[12].

**v)** Primary Sewage Sludge mixed with cow dung in 30-40 ratio converts into good quality manure by vermin-composting[13]. Blended by improved techniques, 2:1 proportion of the finished urban compost and fresh moist sludge and amendment with one percent rock phosphate results in a compost rich in nitrogen with a C/N ratio less than 10 had been found to increase the yields of crops[14].

## PUBLIC PRIVATE PARTNERSHIP

An ULB could mull over a PPP focusing on waste processing and land filling after studying the facilities the private partner would be able to provide like requisite land, transportation system and regular collection of waste from door-to-door. A structured integrated SWM system and capable operator can handle the waste management process efficiently only when he doesn't face the problems of not having requisite land, inadequate technical and managerial experts, lack of funds and market linkages.

## LEGAL ENACTMENTS

Eventually, to overhaul the waste management sector and induce the necessary behavioural change, citizen participation and commitment is the key. Building appropriate institutional framework along with policy-level directions will help facilitate the necessary change[15]. Over the years, the Supreme Court of India and State High Courts have taken-up the cases regarding provision of healthy environment and have led the way in enforcing the related laws through public interest litigation.

**b)** National Green Tribunal (NGT) directed all the states and union territories to enforce and implement the SWM Rules 2016 making it mandatory for the power generation and cement plants to buy and use RDF as fuel in their respective pants located within a radius of 100kms[16]. Each municipal body, in consultation with State Urban Department has to chalk out an Action Plan meeting the provisions as per SWM Rules, 2016. The rules are now applicable beyond municipal areas and extended to all the establishments; the waste is to be channelized to wealth by segregating into wet, dry and domestic hazardous wastes and hand over to authorized rag-pickers integrating them in to the formal system. No person should chuck, burn up, or bury the solid waste generated on streets or open public spaces outside the premises or in the drain or water bodies and

further the generator of waste will have to pay 'User Fee' to waste collector and also imposed 'Spot Fine' for littering and non-segregation of waste.

**c)** The concept of joint venture has been introduced in Swachh Bharat Mission. Bulk and institutional generators, event organizers and hotels and restaurants, market associations, resident welfare and market associations and gated communities are responsible for segregation and sorting the waste and management in partnership with local bodies. New townships and Group Housing Societies are responsible to build-up in-house waste handling and processing arrangements to treating bio-degradable waste within the community area.

**d)** All manufacturers of disposable products or brand owners of such products shall provide necessary financial assistance to local authorities in establishing waste management system. The draft Plastic Waste Management Rules, 2021 issued by the MoEF&CC ban single-use plastic from 2022.

**e)** As per Sec.135 of the Companies Act, companies must have to spend at least two percent of the average profits of three immediately preceding financial years towards CSR activities.

**f)** The Water Act has vested regulatory authority in SPCBs to establish and enforce standards for facilities discharging pollutants into water bodies. The Air Act laid down rules for the prevention, control and abatement of air pollution. The Public Liability Insurance Act 1991 mandates the business persons working with dangerous substances to insure from accidents and also to establish Environmental Relief Funds to provide relief to the affected persons. The Right to Information Act 2005 was designed to promote transparency and responsibility of the government and permits public participation in decision-making.

**Indian laws concerning wastes and waste management in India:**

1. The water (Prevention and control of pollution) Rules, 1975
2. Water (Prevention and Control of Pollution) Cess Rules, 1978
3. The Air (Prevention and Control of Pollution) Act, 1981
4. The Environment (Protection) Act, 1986
5. The Public Liability Insurance Act, 1991
6. The National Environment Tribunal Act, 1995
7. The National Appellate Authority Act, 1997

8. The Municipal Solid Wastes (Management and Handling) Rules, 2000
9. National Green Tribunal Act, 2010
10. Solid Waste Management Rules 2016
11. Plastic Waste Management Rules 2016
12. Construction and Demolition Waste Management Rules, 2016

**Policy Initiatives of the Governments:**

a) Law Commission Recommendation Ecomark Scheme, 1991
b) Policy Statement for Abatement of Pollution, 1992
c) National Conservation Strategy and Policy Statement on Environment and Development, 1992
d) National Environment Policy, 2006
e) National Urban Sanitation Policy, 2008

## CONCLUSION

On the name of development, changing lifestyles and satisfaction of wants, everyone is becoming greed of earning money more than the need and utilizing the natural resources not for the progress but for the destruction of his own life and that of the others. Who gave them this right to cause irreparable loss to human and nature? Population growth, development of megacities and migration of people from rural to urban areas are making SWM in India a major problem. Majority of Indians lack the commitment towards social responsibility of maintaining cleanliness that's why no holistic solution is yet given to confront the challenge of managing solid waste.

The concentration of the municipal officials in transporting and safe disposal of waste is lacking and civilians' behaviour has not tailored the process of segregating organic and inorganic waste from other wastes. Persons doing illegal dumping and burning waste at street corners and manufacturing unwanted plastic have to receive punishments or penalties. Government can impose some percentage of tax towards waste collection and disposal in addition to the property tax and also levy special tax for events held in function halls. ULBs may charge for dismantling old house and carrying the debris.

The Government of India has to bequeath strategic leadership to nudge the State Governments in creating an enabling environment for ULBs to fulfill the mandate of effective SWM. Local Governments should to be authorized and have to associate with private sector and promote collective community participation in cultivating awareness and

refining the attitude of people towards eradication of global warming and management of public health by developing an appropriate organized system in controlling waste. Government and local bodies have to sensitise the people on programmes like smart cities mission, swacch survekshan, ease of living index etc and instill a spirit of competitiveness.

Properly engineered waste disposal protects public health and preserves quality of key environmental resources, allow the safe disposal of residual solid waste on land, protects ground and surface water from pollution, fire hazards, problems with animals and birds and reduces greenhouse gas emissions. Waste management needs to be regarded as an essential public service by using the waste as a resource of value driving innovation. Digital technologies are safer and translucent and are a perquisite to the waste management sector and investment in digital services in metro and urban areas is economical. Improvements and investments in civil infrastructure in protecting the environment are the major requisites for the country for effective economic growth. WtE technology for recycling can drastically reduce dumping in India.

The Government may supply required kit for collecting waste and take necessary care for the health of waste-pickers by making them partners in the maintenance of clean and hygiene atmosphere and also provide insurance benefit. Government has to consider the proviso of tax concessions, finance at lower rate of interest, subsidized power supply and construction of roads to the processing units and landfills to encourage the edifice of PPP in SWM. Corporate sector may take the basic responsibility as a constituent of CSR in constructing toilets for girls in schools in rural areas which also encourages in increasing number of girls going to schools.

A clear regulation, implementation, monitoring and evaluation with financial penalties, utilization of the services of NGOs, SHGs, research institutions, media, medical staff in developing responsible citizens in reducing unnecessary waste and treatment of waste a resource opportunity are to be mulled. Legal changes and notifications are to be put in place in compliance with the SWM rules 2016, and the local Governments have to secure autonomy to impose stringent actions against those who violate the rules. In addition, the regulatory regime needs to be strengthened and its enforcement be ensured.

As the social order transpires prosperous and comfortable, it becomes more squander. This is the stepladder of prosperity we must not aspire to clamber. At last it’s the consumers who to educate at self level on the mounting of waste and add contribution to a sustainable future; it’s the person’s mindset to change.

**REFERENCES**


1. Census of India 2011, Population Projections for India and States, 2011 – 2036, Report of the Technical Group on Population Projections, July,2020, National Commission on Population, Ministry of Health & Family Welfare, Nirman Bhawan, New Delhi – 110011.
2. Research Studies comparative, Minsitry of Statistics and Programme Implementation, Government of India.
3. Abhishek Dutta and Wanida Jinsart, Waste generation and management status in the fast-expanding Indian cities: A review, Journal of the Air & Waste Management Association, Vol 70, May 2020, Issue 5, Pages 491-503.
4. "Report of the Task Force on Waste to Energy." Extracted from Solid Waste Management in Urban India: Imperatives for Improvement, Satpal Singh ORF OCCASIONAL PAPER 283, November 2020.
5. National Inventory on Generation and Management of Hazardous and Other Wastes (2019-20) January, 2021 Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Govt. of India.
6. "The National Action Plan for Municipal Solid Waste Management" In compliance with Hon'ble National Green Tribunal Order Dated 5th February, 2015 in the Matter of OA No. 199 of 2014, Almitra H. Patel & Anr. Vs Union of India &Ors., Central Pollution Control Board.
7. Shailshree Tewari, Why India's solid waste management system needs a digital overhaul, Published: Thursday 25 February 2021.
8. Samir Lahiry, Indian Challenges in Waste Management, Down to Earth, 9 Jan, 2017.
9. Shantha R. Parthan and et.l Cost Estimation for Solid Waste Management in Industrialising Regions-Precedents, Problems and Prospects, CORE, UC Research Repository.
10. Jnu-Envis, Usha Mina et.al., Waste and Waste Management in India, May 2019 ENVIS RP:Geodiversity & Impact on Environment, Vol -22(4),2016-17, pp 6-7.
11. JNNURM: An Opportunity for Sustainable Urbanisation Final Report, Indian Institute of Human Settlements, December 2012.
12. Siddharth Ghanshyam Singh, International E-Waste Day: Why India needs to step up its act on recycling. Published 14 Oct 2020.

13. Renuka Gupta and V.K.Garg, Stabilization of primary sewage sludge during vermicomposting, Journal of Hazardous Materials, Volume 153, Issue 3, 30 May 2008, Pages 1023-1030.
14. A.C.Gaur, Recycling of organic wastes by improved techniques of composting and other methods Resources and Conservation, Volume 13, Issues 2–4, Feb 1987, Pages 157-174.
15. Mathangi Swaminathan, How Can India's Waste Problem See a Systemic Change? EPW, Vol. 53, Issue No. 16, 21 Apr, 2018 20 April 2018.
16. India environment portal, knowledge for change Judgement of the National Green Tribunal regarding municipal solid waste management in India, 22/12/2016.
17. Swachh Bharat Mission website
18. JNNURM website
19. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Government of India website.
20. Statista website.