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EVOLUTION – IMPACT OF MUNICIPAL SOLID WASTE DUE TO CHANGING ERA IN INDIA

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ABSTRACT

Municipal Solid Waste (MSW) which means the waste generated from the household shall be treated and managed promptly, otherwise results in environmental degradation that leading to threatens animals and human life ultimately creates a huge pessimistic impact to attain sustainable development. Due to the development of modern era and the changes in necessity and usages influencing the lifestyle of the people which are much need during the age of revolution. The Central and State Governments are regulating MSWM in both urban and rural areas in India by making rules and initiating various schemes. As the time runs, the era changes and the people must adopt the modernization for that era which also has its impact in uses. Due to the era of disruption, the breaking of old usage and practices by the people pattern changes and new structure emerges. As the want of people changes as the per the changing era determines the waste generation in the country which needs to handled and managed properly.

Keywords: *Municipal Solid Waste (MSW); sustainable development; modernization; waste generation.*

INTRODUCTION

Globally, Human beings tend to use natural, man-made, and currently mechanical resources to meet their day-to-day necessities. The usage cannot be restricted and controlled while there is large resources spread and manufactured throughout the Country and the waste determines that consumption. After usage and consumption of resources, the waste thrown out the

household or collected by the Municipal or Corporation which may or may not be degraded on long run are needed to be handled forthwith. Basically, the human beings urge to meet their basic necessities for their living which is much available naturally and are largely available and are eco-friendly but due to the sudden rapid changes in lifestyle of the people to maintain their status in the civilized world due to urbanization and population growth they are tend to use modernized goods which are manufacture by using hazardous materials such as plastic, batteries, pesticides, household cleaners, paints and solvent and the waste from usage of such things became Household Waste. Primarily, MSW is biodegradable as it consists of food, papers, cloths, wood, and furniture, household cleaners that becomes hazardous only on adding non-organic substances and non-degradable on long run. Due to lack of knowledge of the impact on its usage of such hazardous materials that to in the Household, it subsequently becomes practice and creates a gap between the usage and non-proper treatment of waste leads to mismanagement. The MSW must be promptly segregated, transported, treated with proper mechanism, and modes for disposal of MSW. Otherwise, it creates adverse impact on the human health and environment at large. To safeguard natural resources, health, wealth, monument, and to attain environment sustainability of the Country ultimately the World, the disposal from the residential, commercials, schools, industries etc., must treated and disposed predominantly.

EVOLUTION

The MSWM is not a new concept in India. Generally, Waste is being generated from every usage. It needs management otherwise, the waste becomes hazardous to human health, and environment that cause natural disasters like floods, tsunami, storm, volcanic eruption, climate change, global warming etc. Historically, the consumption was from nature that does not need any techniques for its treatment as it is decomposed naturally on its run. Due to the changes in lifestyle of the people, i.e. when the consumption of goods become trade and adding of hazardous substance and waste thrown out of such consumption that has non-biodegradable nature in, other words, cannot be decomposed itself either shortly or long run, needs technical assistance for its treatment. Therefore, MSW has been classified as per the nature of goods, consumption, manufacturing, and its disposal.

DURING LAST STONE AGE:

During Last Stone Age period (BCE 3000), when the first settlement took place by making small groups in thatch huts and dung, also developed farming of crops, and hunting results in ending Nomadism.

Thereafter, the concept of permanent homesteads, and culture begins to rise[1] and the concept of consumption by staying at one place also increases. In ancient times, human beings depended on nature and there is no chance of hazardous disposal and no need for management as it decomposed naturally.

DURING INDUS VALLEY CIVILIZATION:

The city planning was achieved only during Indus Civilization. The early cities of Mesopotamians concentrate in making of buildings connected by a maze of winding streets and also laid out their precise grid systems. Early Indus Valley engineers are also well versed in plumbing and sewage systems which could rival any urban drainage systems build before the 19th century[2]. It is pertinent to note that the ruined city of Harappa City and Mohenjo-Daro was once a great urban centre during Harappa Culture or Indus Civilization.

It is witnessed that the Indus Valley was proud of its beautiful cities and population and maintained them clean seems it as civic duty. Homes are equipped with build-in trash chutes, household waste fell through the chute into dust bins. Archaeologists found that public trash bins located throughout the metropolises is the beginning of MSW in India[3]. First wonderful sewage and water flushing toilets are given much importance in ancient civilization to the cleanliness is the remarkable one among their achievements.

After the successful journey of the Indus Civilization, it started to disappear along with their systems they have founded and the system went forgotten, and vanished due to lack of educators and scholars who are needed to teach the society. Unfortunately, the improper disposal of waste impacted on climate change, the drying or channel changes in important rivers, and fall of trade during Mesopotamia[4]. At this stage, the importance of cleanliness in ancient civilization was emphasized. From home to hamlet, village to city, civilization cannot be sustained without clean and healthy water.

[1]BBC, (2014) *Neolithic and Bronze Age Britain:Timeline* (, https://www.bbc.co.uk/history/british/timeline/neolithic_timeline_noflash.shtml

[2] Saifullah Khan, *Sanitation and wastewater technologies in Harappa/Indus Valley Civilization (Ca.2600-1900 BC)*, https://canvas.brown.edu/files/61957992/download?download_frd=1

[3]Swachhata Sanskriti, *From the historic to the Holy India's Swachchta Legacy*, , https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/Swachhata-Sanskriti-Draft-G2-Small-Review-Copy.pdf

[4]Swachhata Sanskriti, *From the historic to the Holy India's Swachchta Legacy*, https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/Swachhata-Sanskriti-Draft-G2-Small-Review-Copy.pdf

DURING THE PERIOD OF EMPIRES:

During the time of Maurya, Gupta, Vijayanagara, other Empires, and Kingdoms of the Indian Sub-Continent strictly maintained and focused on water and sanitation. During late 500 BCE, the city of Ujjain has elaborate drainage and sewage system which also included pottery ring or pierced post soak-pits for treatment of domestic wastewater[5]. As per the Archaeological Survey of India, the Vijayanagara Empire of South India was given importance of sanitation. Excavation in ancient capital have uncovered private toilets that were connected to drainage and sanitation systems[6].

In the period of Athens (500 B.C), the members of the household has the responsibility to take their garbage to its disposal site whereas with the Roman Empire, the first garbage collection service was initiated i.e. after people threw their refuse into the streets is collected and transported to an open pit located within the community for its dumping. It is sad to say that no organized waste collection was followed. Major problem faced during 1700s was management of Municipal Solid Waste which is still dumping in the streets, and open burning of garbage is the major problem[7] leading to climate change, environmental pollution, and threat to public health.

In India's Golden Age, agriculture is increased in making new investments on irrigation and wells provide continuous source of water. Subsequently, during Gupta Period, cleanliness is considered as virtue and indoor sanitation was also practiced[8].

SANITATION DURING MUGHAL EMPIRE:

In Prophet Muhammed, especially in relation to protecting of waste and the places of human being were given greater importance for clean sanitation. As per ancient Vedic teachings, the Islamic instructions, and codes have emphasized the human beings to help in promoting

[5] F.Fardin, Annick Holle, Emmanuelle Gautier Costard, Jacques Haury, (September 2014), *Sanitation and Water Management in south Asia,* ://www.researchgate.net/publication/266911695_Sanitation_and_water_ management_in_ancient_South_Asia

[6] Kumar, Alok, "*Squatting with Dignity: Lessons from India,*" Sage Publications, India, 2010.

[7] Ocean Sentilets Club, (October 10, 2020), *A Short History of solid waste management,* https://taras.org/2020/10/10/a-short-history-of-solid-waste-management/#:~:text=In%20the%20United%20State%2C%20the,cities%20offered%20garbage%20collection%20services.

[8] Tawade, Prathmesh, *Economic Development Of India From Indus Valley To The Gupta Empire, University of Mumbai*,,https://www.academia.edu/7468582/Economic_Development_of_India_from _Mohenjadaro_to_Gupta_ Empire

cleanliness in body, environment, mind, and soul[9].

During the Dark Ages or Middle Ages, practices in respect of sanitation was changed in India. Sulabh International Founder, Bindeswar Pathak says, with the founding of the Mughal Empire by Babur in 1526, India's sanitation changed for the worse. As discussed above, on fall of Civilizations, Kingdoms, Empires, and due to population scatterness, and indigenous social awareness among the people on sanitation infrastructure and the knowledge to maintain the waste properly was lost[10].

INDIA UNDER COLONIAL RULE:

When Queen Victoria (1819-1901) was named Empress of India in 1877, sanitation in her native England had begun to modernize. At this time, Cholera is the biggest killers in England which was recognized as a water borne disease that necessitated to improve sanitation to compat. England is rushed to take care of its own deadly sanitary conditions, and the British Royal Commission was also struggling as the military troupes fell sick due to diarrhoea, the sanitation is also very much needed for India.

Resultantly, Commission for Public Heath were established by appointing sanitation police, and sanitary boards for the enhancement of public health where the actual responsibility for public health lies on the local administrative units like municipalities in the larger towns, and District Boards set up in the rural and semi-urban areas. Since 1881, they were required to raise their own resources, and provide drainage, water supply, general sanitation, maintenance of hospitals, and dispensary and also to other development activities[11].

Mumbai, while under the control of colonial rule since 1534 which is the first Portuguese period and later, British was developed and considered Mumbai as an important place to hub of commerce, and trade engaging people across the world. The city was well modernized but failed to balance its need for sanitation. The colonial Mumbai has high rate of poor and immigrants who not only denied proper sanitation but also blamed for spreading disease and contamination which is being a high instance of disease and death in the population. Cony beare wrote of Cesspools, open drains, the emanated smells into houses and over food, while Leith wrote of

[9]Sharma, Rakesh Kumar; Singh, Sukhvir (May 2015). *"Harrapan interments at Rakhigarhi" (PDF). International Journal of Informative & Futuristic Research (IJIFR).* 2 (9): 3403–3409. ISSN 2347-1697

[10] Pathak, Bindeswar (2008), *History of Public Toilets, Plumbing world, paper presented at the International Symposium on Public toilets, Hongkong,*://germaphobe.wordpress.com/category/uncategorized/page/7/

[11] *Popular response to Epidemics in Colonial Bengal, Indian Journal of History of Science,* 43.2 (2008) 277 - 283.

noxious matters, poisonous gases, and accumulated filth. Streets and areas in the town were designed unsanitary or polluted. India's natural resources such as the salt marshes[12] were degraded, indigenous water management practices by incorporating reservoirs, rainwater harvesting, tanks, and other waste conservation techniques are uncivilized[13] and the funds for their maintenance were withdrawn as many were collapsed. Like ancient Civilization, it is forgotten along with the ancient knowledge that created them due to the long run. At present, these technologies are being rediscovered by the archaeological departments, and it becomes important strategies for staving off drought, recharging groundwater, improving sanitation and irrigating farms.

DURING BUDDHA PERIOD:

Lord Buddha emphasized on the importance of sanitation, and hygiene which was incorporated, educated, and practiced in his daily routine. It is also to be noted on the fall of Roman Empire in the 3rd century there is also sanitation regression and loss of wealth standards of the nation[14].

FIGHTERS ON SANITATION IN INDIA:

Dr.B.R.Ambedkar (1891 - 1956) who is the Father of the Constitution of India campaigned against the social discrimination of manual scavengers while untouchability resultantly, it does not exist until 200 A.D. and later, emerged during 600 A.D[15]. Swami Vivekananda and his British born discipline Sister Nivedita also dedicated their work in construction of household drains and the importance of the property for the future upliftment of society.

RAISE OF SANITATION AFTER INDEPENDENCE:

After independence, due to population growth, and changes in lifestyle of the people increases pollution and that becomes the greater hindrance to achieve pollution free environment, clean water, fresh air, and to lead healthy life. The

[12] Night-soil means the human excrement collected using wooden carts and head baskets and utilized as fertilizers. For Example- Night soil were collector and later iron carts from Britain, struggled to collect ever increasing amounts of human waste from the streets, which was taken by train to Sion and Kurla north of the Island city and mixed with ash and vegetable matter and dumped into salt marshes.

[13] Journal Compilation, Joint Editors and Blackwell Publishing Ltd.*"Governing the Contaminated City," International Journal of Urban and Regional Research* 32.2 © 2008 (Page 419)

[14] Royuela, Albert Montserrat, Doctoral Thesis, University of Girona, Spain 2015, *Towards better management of combined sewer systems – a methodology based on low-cost monitoring*, (April 13, 2022 at 01.03), http://hdl.handle.net/10803/387560

[15] Shyamlal, "*The Bhangi: A Sweeper Caste, Its Socio-economic Portraits," Popular Prakshan* Publishers, 1992

Swatch Bharat Abhiyan is not the first sanitation programme in India, but no sanitation mission has been successful. Sanitation is the key priority in ancient India and was given major importance to enhance hygiene in Vedic scriptures. Due to the raise in rural poverty and urbanization in colonial rule, sanitation ceased to be the national priority[16].

During 1950s, the sanitary landfill which is defined as an engineered method of disposing solid waste on land by spreading the waste in thin layers, compacting it into a small volume and then covering it with soil each day after its dumping. The excessive population and their fancies in using of consumer goods lead to explosive garbage. The refuse is recycled and re-introduced in the production cycle whereas some refuse is incinerated which leads to the production of electricity as a conversion of waste to energy. Finally, the remaining waste winds up in a landfill i.e. placing garbage in large pits and cover it with layers as it won't change its layers[17] even on long run.

IN RURAL AREAS IN INDIA:

Solid waste management is not only a problem in urban areas but also in rural and semi-urban areas in India. In rural areas, MSW include waste from kitchens, gardens, cattle sheds, agriculture, and materials such as metal, paper, plastic, cloth, and so on which may be organic and inorganic materials with no remaining economic value to the owner produced by homes, commercial, and industrial establishments[18] are disposed of. Most of the household waste in rural areas is organic, with less inorganic material, and non-toxic. The inorganic and toxic waste that remains unpicked by the municipality or waste pickers in roadside, vacant places, outside drainage is a manure becomes hazardous substance by destroying the beauty of the place and creates public health issues and environmental hazards to the people. People in rural areas have agriculture, cattle feeding, poultry as their source of income and the same is dependent on natural resources that gets polluted due to mixed waste which is used for animal feeding. In rural areas, the biodegradable fraction is used in many cases for feeding

[16]Saptarishi Dutta, sonia Bhaskar, (2017) I*ndia@70:A Brief Colonial History of Sanitation In India*, (April 14, 2022 at 08.53 AM) https://swachhindia.ndtv.com/india70-a-brief-colonial-history-of-sanitation-in-india-10602/

[17] Ocean Sentilets Club, (October 10, 2020), *A Short History of solid waste management*, (April 15, 2022 at 10.05AM), https://taras.org/2020/10/10/a-short-history-of-solid-waste-management/#:~:text=In%20the%20United%20States%2C%20the,cities%20offered%20garbage%20collection%20services.

[18] *Solid and Liquid Waste Management in Rural Areas*, (2016), (April 6, 2022 at 08.15),) https://jalshakti-ddws.gov.in/sites/default/files/Primer%20SLWM.pdf.

farm animals. The rural population habits make organic waste SC, anaerobic digestion or composting unsuitable options[19]. Because of its environment-friendliness, composting is a highly suitable method of waste management in rural areas.

The panchayat in rural development plays a important role after independent and it was emphasized in various policies made by the Central or State Government[20]. At Gram Panchayat (GP) level, monitoring can be undertaken by Panchayat or ward members in different wards or hamlets of a Panchayat. The Government of India (GOI) and some of the State Governments are encouraging GP to manage MSW in their jurisdiction with proper management system in rural areas[21].

IN URBAN AREAS IN INDIA:

MSW is the fraction of Solid Waste that is generated in an advanced urban economy[22]. Due to an increase in urbanization and concentrating in per capita income in India, there is an increase in MSW by consuming electronic and plastic waste where directly contributed to increase in large number of domestic hazardous waste. When it is left as untreated or when it is irregularly treated without proper techniques on the towns or cities results in water contamination, and air pollution leading to health hazards and environmental impact. The municipal solid waste in India is classified into 3 categories. They are,

- Biodegradable waste or organic waste (food and kitchen waste, green waste vegetables, flower, leaves, fruits and paper, etc.)
- Inert and non-biodegradable waste (construction and demolition waste, dirt, debris, etc.) and
- Recyclable waste (plastic, paper, bottles, glasses, etc.)[23].

[19] Simona Ciuta, Tiberiu Apostol, Valentine Rusu, Urban and Rural Stream Characterization For Separate Collection Improvement, (2015), researchgate.net/publication/271528610_Urban_and_Rural _MSW_ Stream_ Characterization_for_Separate_Collection_Improvement.

[20] Suman Kumari, Shahnawaz Alam,(2015), Role Of Gram Panchayat In Rural Development A Study Of Mathura District Uttar Pradesh https://www.ingentaconnect.com/content/doaj/22778616/2015/00000004/00000008/ art00269.

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[22] Dimpal Vij, (2012), *Urbanization and Solid Waste Management in India:Present Practices and Future Challenges*, https://core.ac.uk/download/pdf/81943906.pdf

[23]Satpal Singh, (Nov, 2020), *Solid Waste Management in Urban India : Imperative for Improvement,* https://www.orfonline.org/research/solid-waste-management-in-urban-india-imperatives-for-improvement-77129/#:~:text=In%202016%2C%20the%20world's%20cities,3.40%20billion%2 0tonnes%20 in%202050.%E2%80%9D.

The waste in urban area is collected at door to door collection of waste, waste segregated from household including slums, informal settlements, commercials, institutions, multi-storage buildings, large commercials, malls, housing complexes, and non-residential premises at their entry gate or any other location flexible to collect the waste, as the waste is segregated as bio-degradable and non-biodegradable materials which is the first effective step for efficient treatment of MSW in India. But in respect of collection of waste in bins i.e either movable or fixed, no segregation of waste is possible that is placed in the area or street for disposal of MSW leading to unauthorized collection of waste by the municipality[24]

IN METROPOLITAN CITIES IN INDIA:

MSW in metropolitan area is greater than other towns in India. Before pandemic, the Mumbai region in Maharashtra is one of the top lists in Municipal Solid Waste generation includes all kinds of waste such as bio-degradable, non-biodegradable, constructions, plastics, metals, and all other waste. The waste generated is also dumped in Deonar, Gorai, Mulund and Kanjurmarg[25]. Though the waste from such cities needs safe management, most of the metropolitan cities in India remains in landfilling as it is open, uncontrolled and leads to poor management giving serious environmental degradation[26].

CONCLUSION:

India is diverse in nature. The surplus of natural resources is given by the god for the usage of human beings, animals, birds and all other creatures in the earth. Those natural resources are sufficient to meet the needs of the human beings for all generations for survival. Subsequently, when the survival ends and necessity increases, the nature resources were utilized largely to satisfy the need of human being and now it is not only deficit but also hazardous and threat to human beings, wildlife, and all other living and resources. The pressure increases in the earth due to the continuous usage of natural resources by the human beings to meet day to day necessities, despite working on revamping it. Modernized lifestyle of the people,

[24]Mufeed Sharholy, Kafeel Ahmed, Gauhar Muhamood, R C Trivedi, (Feb 2009), *Municipal Soild Waste Management In Indian Cities*,://www.researchgate.net/publication/6394075_Municipal_solid_waste_management_in_Indian_cities_-_A_review

[25] Mayank Aggarwal, (15 october 2019), *Mumbai and Delhi generate most solid waste among metro cities*https://thewire.in/environment/indias-megacities-mumbai-and-delhi-sitting-on-a-pile-of-waste.

[26]Muffeed Sharholy, Kafeel Ahmed, Gauhar Mahmood, R.C. Trivedi, ((February 2007), *Municipal Solid Waste Management in Indian Cities, A review,* ://www.hpccc.gov.in/PDF/Solid_Waste/Solid%20Waste%20India %20Review%202008.pdf

changed their consumption behaviour that generated several hazardous types of waste which need multiple types of handles and treatment methods of such waste. Nevertheless, the waste disposed from the MSW is not less than the other waste, which may be biodegradable, non-biodegradable, organic, and inorganic, that needs disposal and management on adopting and implement such methods of treating such wastes.

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