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Clean India through Sustainable Solid Waste Management in Rural Areas

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Abstract: Swachh Bharat (Clean India)is a cleanliness drive intended to cover 4,041 statutory cities and towns all over India in order to clean the streets, roads and other infrastructure. Swachh Bharat Abhiyan is a cleanliness drive run by the government of India and initiated by the Honourable Prime Minister, Narendra Modi. It is a most key topic which our children and students must know and be conscious of this mission. It is a general topic which students are usually given in their schools to write or say something on Swachh Bharat or Swachh Bharat Abhiyan.(9)
India is the second fastest growing economy and the second most populated country in the world. The population of India is predictable to increase from 1029 million to 1400 million during the period 2001–2028, an increase of 42% in 26 at the rate of 5.2% annually About 852 million people live in rural areas and 325 million live in urban areas. The level of urbanization of the country has increased from 26.5% to 38% in the last 50-60 years and is expected to rise to 44% by the year 2026.

I. INTRODUCTION

Solid waste has become one of the biggest problems and its management is one of the major issues now days for our environment. The problem is not restricted to a single place rather it covers all parts of the environment which leads to toxic pollutants. Developing countries like India face major problem of solid waste management in urban as well as in rural areas.
It is necessary to have accurate information on planning a proper solid wastes management in rural areas of country. On the other side the lack of knowledge on the unfavorable health effects of solid wastes has increased the occurrence of infective diseases. In order to improve the quality of life of rural people, water supply and environmental sanitation need to be improved by removing waste and clean the area. Solid and liquid waste management both come under environmental sanitation. The objective of solid waste management in rural areas is to collect the waste at the source of generation, recovery of recyclable materials for recycling, conversion of organic waste to compost and secured disposal of remaining waste by proper way

A. What is Waste?

Waste can be defined as: • Any material or liquid that is left over after productive use or which is not have any furtheruse in its current form and is usually discarded as unwanted material ;and • Material related to human activity in comparison to nature which has its own system of recycling waste such that it ultimately becomes a resource: for example, organic matter such as leaves, branches, and so on, decompose to form compost.

B. Why is Safe Disposal of Waste Important?

Safe disposal of waste can lead to: • Health benefits from safe disposal of waste that would otherwise contaminate the environment; Economic benefits through reuse/recycling of products that would have been discarded as waste; and • Aesthetic benefits from a clean environment without unsightly decomposing waste dumped in the open.

C. How can Waste be Classified?

Waste can be classified in different ways: • Based on its physical properties, waste can be categorized into solid waste (for example, garbage) and liquid waste (for example, waste water) • Based on pattern of use, it can be classified into human waste (feces, urine), animal waste, farm waste and industrial as well as commercial waste; and • Based on source, waste can be categorized as municipal waste (for example, household waste, commercial waste, and demolition waste), hazardous or toxic waste (for example, radioactive waste, explosives waste and e-waste), and biomedical waste (for example, hospital waste).

D. What is Solid Waste?

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Solid waste can also be defined as the organic and inorganic waste materials created by households, agricultural farm that have no economic value to the owner. Solid waste in rural areas commonly includes-house sweeping, kitchen waste, garden waste, cattle dung and waste from cattle sheds, agricultural wastes, broken glass, metal, waste paper, all types of plastic, cloths, rubber, waste from markets and shopping moles and other food selling areas etc.

The U.S. Environmental Protection Agency (EPA) defines solid waste as "any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.(10)

It is categorized in two heads as:

Biodegradable and

No biodegradable.

1) *Biodegradable Waste:* is that which can be decomposed by biological processes, for example, vegetable peel, food, farm waste, and so on. Organic waste is biodegradable and it can be recycled; and
2) *No Biodegradable Waste:* cannot be cracked down by biological processes, for example, paper, glass, metal, and so on. No biodegradable waste can be further classified into two types: recyclable and nonrecyclable – Recyclable waste is that waste which has economic value that can be recovered, for example, metal, paper, glass, plastic bottle, and so on – No recyclable waste is that waste which does not have economic value of recovery, for example, tetra packs, thermocol, and so on.

E. Waste Management in Rural Areas

In India particularly in rural areas, waste is a severe threat and danger to the public health concern and cleanliness. Both form of waste (both solid and liquid) generated in rural areas is predominantly organic and biodegradable yet becoming a major problem to the overall sustainability of the ecological balance. There are various methods for solid waste management some of are given below:

F. Landfilling

In India too most of the waste is landfilled. The methods followed are not in keeping with modern practices of sanitary landfilling. Land filling refers to depositing or location of construction and demolition (C&D) materials as fill material on land, which results in an elevation of ground level. This also includes filling of watercourse, such as stream course, pond, etc. Land filling In India too most of the waste is landfilled. The methods followed are not in keeping with modern practices of sanitary landfilling. Land filling refers to depositing or location of construction and demolition (C&D) materials as fill material on land, which results in an elevation of ground level. This also includes filling of watercourse, such as stream course, pond, etc. Land filling activities are generally carried out for purposes of filling up ponds; leveling off uneven ground surfaces; forming site for development e.g. landscaping, roads, village houses, car parks or recreation facilities;(11)The wastes are largely dumped. This dumping is normally carried out in low lying areas which are prone to flooding. During rainy season, possibility of surface water contamination increases due to flooding of these low lying areas. The ground water pollution though largely unassessed is another threat posed by dumping of wastes. The daily cover techniques are poor leading to vector problems. The birds foraging on garbage dumps are known to cause substantial problems for aircrafts operating in the urban areas. The bird strikes have resulted in a great deal of loss to aviation sector. This state of affairs results from lack of knowledge and skills on part of local authorities. Diversion of large part of money to collection and transportation of wastes results in non-availability of funds for disposal activities. This forces local authorities to curtail even known precautions and practices and use short cut approach.

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G. Composting

Composting is nature's process of recycling decomposed organic materials into a rich soil known as compost. Everything that was once living will decompose. Generally, verandah or house porch composting is an acceleration of the same process nature uses. By composting your organic waste you are recurring nutrients back into the soil in order for the cycle of life to continue. Finished compost looks like soil–dark brown, crumbly and smells like a forest floor. (13)

Composting is a highly suitable choice for urban solid wastes in India. High organic content and moisture make it particularly attractive. Theoretically, the idea of composting is appealing as it helps to recycle the nutrients back to land. In composting process the organic matter breaks down under bacterial action ensuing in the formation of humus like material called compost. The value of compost as manure depends on the quantity and quality of feed materials poured into the compost pit. Manure from composting gives improved yield to farmers and it is also environment friendly. Bio degradable solid waste can be composted either incompost pit or in a vermicomposting pit.

H. Incineration

Waste-incineration facility includes the following operations:

Waste storage and feed preparation. Combustion in a furnace, manufacturing hot gases and a bottom ash deposit for disposal. Gas temperature reduction, often involving heat recovery via steam generation. Treatment of the cooled gas to remove air pollutants, and disposal of residuals from this treatment process. Dispersion of the treated gas to the atmosphere through an induced-draft fan and stack. (12) Incineration is not a total solution for solid wastes. The inert remains still have to be landfilled or used otherwise. This acts as a volume reduction stepThe technology for incineration is not available indigenously and import options from outside are highly capital intensive. During 1980's an incineration plant was set up at New Delhi at a cost of Rs. 220 million or US$ 6.9 million (May 94). This 300 TPD plant was set up using Danish technology with assistance.. It was also expected to generate power for local grid. The operational experience was not satisfactory. The desired calorific value garbage did not reach the facility as a result of prior segregation due to market mechanisms and scavengers. In spite of apparent failure of this attempt, incineration will remain an option for coming year and experience gained in this venture will be useful. In the meanwhile, incineration on smaller scale with or without energy recovery will continue to be a viable option in a number of location and waste specific cases such as hospital wastes.

I. Anaerobic Digestion

For high moisture and organic content of Indian wastes, the anaerobic digestion is another suitable option. However, there are no ready technologies available for processing heterogeneous material such as urban solid wastes. The existing methods are suited to homogeneous materials. The costs of cleaning and separating mixed heterogeneous wastes are likely to be high.A good way to avoid these problems is to intercept suitable wastes at the point of generation before it is mixed with other wastes. Kitchen and vegetable market wastes are largely suited for this purpose. These wastes can be collected and treated at source, if space permits. The resulting bio-gas can be used for captive energy use such as lighting and cooking etc. Few Bio-gas systems are currently available to treat wastes of fruit and vegetable origin (Nagori et al. 1988) (8). Though currently unfeasible as a large scale option, Bio-gas systems can effectively handle localized and specific wastes and contribute to environment friendly disposal of wastes.

J. Refuse Derived Fuel (RDF)

This method of waste disposal primarily views waste as a resource. After separation and size reduction, the combustibles can be pelletised. Integrated Waste Management project at Bombay tried to do just that. Due to local conditions, the product off-take and price realization was estimated to be good. This sidestepped the earlier problem faced by composting plants. The large scale processing of garbage was also supposed to extensively slow down collapse of landfill space in the near locality of the city; avoiding need to spend much larger amounts on transportation costs. This pilot technology development effort also open prospect of totally indigenous and economical technology. The cost of 80 TPD plant was Rs 15 million or nearly half million US dollars (May 94). This compared very favorably to N. Delhi incineration plant (300 TPD, Rs 220 million). As it was first attempt of its kind, it required experimentation and modifications to zero down on specific waste handling, size reduction and separation processes along with optimization of system parameters. The plant was erected and extended trials were undertaken. A number of new innovation were made in garbage separation methods. The fuel pellets produced were also test marketed successfully. However, there was a need to support the technology development effort for a long enough duration which has been lacking. Despite the promise of RDF,

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it will be limited in application due to need to have large industrial areas in close proximity to market the fuel to. The cost differential between cost of coal and the RDF should also be attractive to ensure sales.

K. Importance of Waste Reduction

In the prosperous countries, the main motivations for waste reduction are frequently related to the high cost and scarcity of sites for landfills, and the environmental degradation caused by poisonous materials deposited wastes. There are lacks of positive significant for encouraging about benefits from waste reduction. Money is barrier of reduction solid waste and absence of technological procedure.

To save people and children from viral, chronic disease reduction of solid is most important. We can reduce the using of energy by reuse of paper, plastics and other recycled materials.

To reduce global warming as well as reduce surface air temperature.

To reduce the growth of mosquitoes, bacterial, kits and poisonous organism

To make our global clean and healthy.

Rural area requires toilet to save people from viral disease.

Reuse, recycling, and reclamation are various ways of management of hazardous wastes if we properly conducted, then we can avoid environmental hazards, protect scarce natural resources, and decrease the nation's dependence on variousraw materials and energy.

Forest and locality is catches fire by the cause of methane gas h releases from solid waste. So effective and safe management of this waste is required.

L. Recommendations for Clean India Movement

The recommendations can be broken up under various categories such as:

1) Manpower/Education & Training
2) Regulatory & Fiscal
3) R & D and Technology Development

M. Manpower/education & training

1) Local governments should work towards infusion of greater management and supervisory skills. 2. Data and knowledge base at the local govt. level should be strengthened.
2) The problem of more-staffing should be given serious socio-political consideration.
3) Education efforts should focus on women to highlight proper household disposal, segregation and community participation.
4) Steps should be taken to improve health status of scavengers.
5) Community education in various segments of the community need to be educated. It must include the households, , shopkeepers, tea stalls, local restaurants, school children, marriage and community halls etc.
6) Students Orientation: and culture evening for villagers for awareness and proper waste management
7) Announcing Prizes & Gifts to the peoples of rural area to motivate them for clean India As part of local festivals institute some awards such as, 'Street of the Year Award' or 'Best Residential Locality Award'. It must be given every year so that people have some inspiration to keep clean

N. Regulatory & Fiscal

1) Local bodies should awaken to the need for suitable legislation as per the prevailing local conditions.
2) Privatization of collection and transportation of urban solid wastes is highly suggested. It will help provide a limit on expenditure, reduce inefficiency and provide better level of service
3) Private initiatives in waste disposal or utilization should also be encouraged by way of fiscal and other incentives.
4) A nominal wastetax(cleanliness tax) along the lines of house tax is recommended. It will generate more finances and also bring into focus much neglected problems of solid waste.
5) Secondary products should be regulated to protect consumers.

O. R & D and Technology Development

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1) Standard practices for sanitary landfilling under Indian conditions should be developed.
2) Technology and training packages for semi-mechanized aerobic composing at small and medium scale should be developed.
3) R & D outcomes should concentration on developing improved plants for wastes from vegetable markets, kitchens and restaurants etc.
4) Recycling in the informal sector should be quantified.
5) Facility for Treatment & Treatment of Waste

P. Government Initiatives

India has established a national program that is designed to give total sanitation coverage in India by 2012. This program is called the Total Sanitation Campaign or TSC for short. The program is operational in 578 out of 600 districts nationwide with outlay being approximately 3.35 billion dollars. This is split into a central and state share as well as community contributions. Since its inception the TSC has revolutionized the sanitation sector across the country. In 1981 sanitation coverage was 1% compared to 48% in 2007 (UNICEF India, 2008). Due to this being part of the government's five year plan, it is an important program and is getting the funding needed to improve fresh water supply and bring sanitation systems to districts where they did not exist previously. The Programme was launched in 1986 with the objectives of improving the quality of life of rural people and providing privacy and dignity to women. The concept of sanitation was expanded in 1993 to include personal hygiene, home sanitation, sage water and disposal of garbage, human excreta and wastewater. The components of the programme include construction of individual sanitary toilets for household below poverty-line (BPL), conversion of dry latrines to water-pour flush toilets, construction of village sanitary complexes for women, setting up of sanitary marts and production centers, intensive campaign for creating awareness and health education, etc. Recently "In one year, from August 15, 2014, to August 15, 2015, under the Swachh Bharat SwachhVidyalayaprogramme, we have constructed 4,17,000 toilets in over two lakh schools. Recently in clean India mission Government of India have following mian agenda

Eliminate open defecation by constructing toilets forhouseholds, communities

- Eradicate manual scavenging
- Introduce modern and scientific technology for municipal solid wastemanagement practices
- Allow private sector participation in the sanitation sector
- Change people's attitudes and mind set to sanitation and create awareness for their better health in rural area

II. CONCLUSION

In India, where a third of the population lives below the poverty line, the basic necessities most western societies take for granted are not available. Sanitation is one such area that is greatly lacking in these needy areas of India.In the rural area the waste management is important because without waste management the people is suffering from different type of dieses. The waste disposal needs immediate attention and strict monitoring. Various new techniques have been applied for storage, collection, transfer and transportation.The education of the people is always the deciding factor in determining whether the people will accept to change their ways and embrace a new way of hygienic sanitation. Different methods have been suggested and since the development of the sanitation sector has been on the rise since the mid 1980's, there have been plenty of time to perfect teaching methods. By taking various initiatives forremoving each and every place a clean India would be the best tribute India could pay to Mahatma Gandhi on his 150 birth anniversary in 2019," said Shri Narendra Modi as he launched the Swachh Bharat Mission at Rajpath in New Delhi. On 2nd October 2014, Swachh Bharat Mission was launched throughout length and breadth of the country as a national movement,

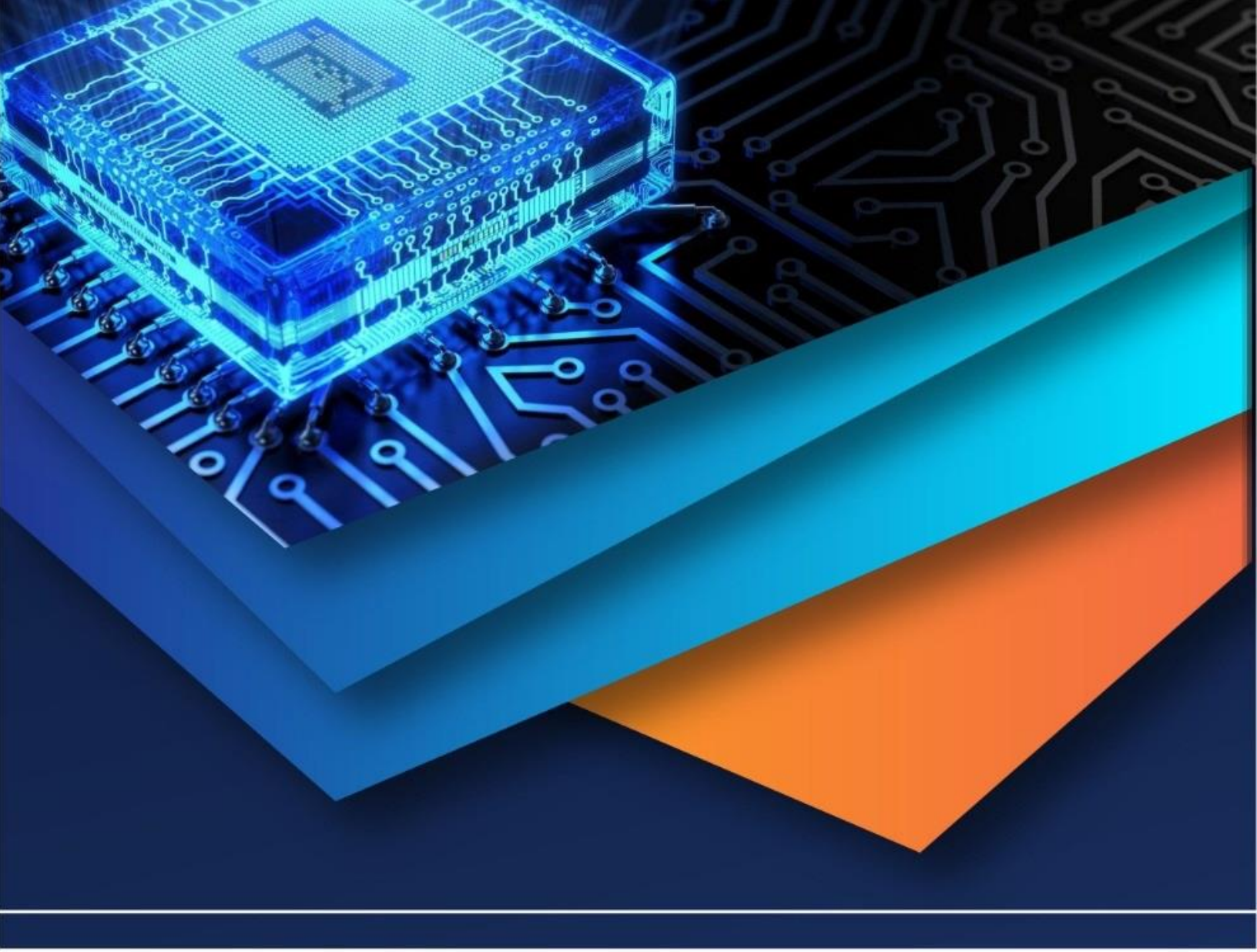
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