

SPWI JOURNAL FOR SOCIAL WELFARE

(A Multi Disciplinary Peer-Review Bi-Quarterly Research Journal)

Volume 3 Issue 4, October-December 2020

Editor

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SOCIETY FOR PUBLIC WELFARE AND INITIATIVES

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SPWI JOURNAL FOR SOCIAL WELFARE
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Volume 3 Issue 4, October-December 2020 RNI Title Code: TELENG/2017/74418 ISSN 2581-6322



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An ISO 9001-2015 Certified Journal

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SOLID WASTE MANAGEMENT IN GREATER WARANGAL MUNICIPAL CORPORATION - A STUDY



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Abstract: *The problem of solid waste management is due to the rapid industrialization and urbanization, growth in population, economic development, changing lifestyles and food habits. According to the UNDP report 1997, uncollected waste is the second most important problem after unemployment in the world. In India, the population residing in urban areas increased from 18% to 31.2% from 1961 to 2011 respectively. Solid waste management is one of the obligatory functions of Municipal Corporations in Telangana State. The Municipal Solid Waste (Management and Handling) Rules, 2000 and Revised Guidelines 2016 lay down the steps to be taken by all the municipal authorities to ensure the management of solid waste according to best practice. As per the rules, they must provide the infrastructure and services concerning collection, storage, segregation, transport, treatment and disposal of Municipal Solid Waste (MSW). In practice, the solid waste is generating high and collecting disposal is low. It requires ecological awareness and citizen participation to segregate waste at source, door to door collection and disposal appropriate is imperative.*

Keywords: *Solid Waste Management, Industrialization, Urbanization, Segregation, Municipality, Treatment, Disposal*

Introduction

Solid waste management (SWM) is one of the most expensive municipal services that have an urban local body has to provide as its obligatory municipal function and absorbs about 1% of Gross National Product (GNP) in the urban areas. About three to six persons per thousand populations are required to cater to this important civic

amenity, which is about 1% to 2% of the total national workforce. It is, therefore, imperative to optimize this huge civic expenditure and evolve an indigenous low cost which is technically sound, financially viable, aesthetically beautiful and socially acceptable to civilians. Solid waste includes household waste, commercial and market area waste, slaughterhouse waste, (e.g., from schools, community halls), horticultural waste (from parks and gardens), waste from road sweeping, silt from drainage, and treated biomedical waste. Solid waste management is one of the most essential functions of the local government authorities in India to achieve sustainable development in the country. Nevertheless, it has also been one of the least prioritized services during the last decades. It is also a major challenge in urban areas throughout the world. Without an effective and efficient solid waste management program, the waste generated from various human activities, both industrial and domestic can result in health hazards and also harm the environment. Understanding waste generated the availability of resources and the environmental conditions of a particular society or important in developing and appropriate waste management system.

Solid Waste Management Policy in India

India is the second biggest populated country in the world after China with more than 1.30 billion people contributing nearly 18% of the world's total population (Official population clock). On the contrary, India is sharing only 5% of the world area accounting for 3,185,263 squares Kms. Out of the total population, 68% lives in rural.

The urban population is increasing day by day for the last few decades. In modern society, industries are an essential part. Developing countries like India are in the industrialization phase which also contributes to urbanization. Lakhs of several people are migrating towards urban centers for better living and employment opportunities. In terms of Gross Domestic Product (GDP), India is one of the fastest-growing economies in the world with an average of 7.30% to 10% GDP. It is expected that India will be growing with a GDP of 10%. Higher GDP will result in improved living standards. Over-population, Rapid-Industrialization is led to more per capita generation in India. Also, uncontrolled urbanization and improved living standards thereby lead to an increased rate of per capita waste generation. Currently, 1,50,000 tons per day of municipal solid waste is being generated due to the various household activities and other commercial and institutional activities (CPCB Report 2018-19).

The SWM policy in India specifies the duties and responsibilities for Hygienic waste management for towns and cities in India. This policy was framed in September 2000 based on the March 1999 Report of the committee for SWM in class 1 cities of India to the Supreme Court. Then after manual or sum proposed by Central Public Health Environmental and Engineering Organization (CPHEEO), Ministry of Urban Development, 2000. After that honorable National Green Tribunal CPCB drafted an indicative National Action Plan waste on MSW rules, 2000 and posted it on the website

for reference of drawing state action plans. MSW rules, 2000 have been revamped and modified the SWM rules, 2016. The National action plan is also re-drafted accordingly to the SWM rule, 2016.

Government Initiatives

The Ministry of Environment and Forests is taking of the issues related to solid waste management together with Central and State Pollution Control Boards. There are various rules framed under the Environment Protection Act-1986 for improving the management of solid waste in India only the Union Parliament is competent to make laws on the Environment.

But solid waste management falls under the state list as it is considered as public health and sanitation as per the constitution of India. Due to its local nature, SWM is the responsibility of Urban Local Bodies (ULBs). Environment protection Act-1986, Hazardous waste Management and Handling Rules -1989, Manufacturing, storage and Transportation of Hazardous waste Rules – 1989, Bio-Medical Waste Management and Handling Rules – 1998, Municipal Solid Waste Management and Handling Rules – 2000, Plastic Waste (Management and Handling) Rules – 2011, E-Waste (Management and Handling) Rules – 2011.

Solid Waste Management in Urban Telangana

The state of Telangana emerged as 29th state in the Indian Union as per the Andhra Pradesh Reorganization Act, 2014 (No. 6 of 2014) of Parliament, which received the assent of the President of India on the 1st March 2014 and came into existence with effect from 2nd June 2014. It is in this background, in the Telangana State the Greater Warangal Municipal Corporation is selected to study the field-level situation in Solid Waste Management.

Objectives of the Study

1. To analyze the Solid Waste Management Policies 2000 and 2016 in India.
2. To analyze and study the Solid Waste practices in Indian Municipal Corporations in general and Greater Warangal Municipal Corporation - Warangal in particular.
3. To study organizational and management practices to ensure the protection of the environment and to protect the health and well society of people.
4. To study the opportunities for facilitating effective people participation in Solid Waste Management.
5. To ensure the protection of the environment through effective waste management measures.

Research Methodology

The methodology is based on a combination of primary and secondary data collection. The structured questionnaire methods, informal discussions and participatory observation methods are to be adopted for the study of the Greater Warangal Municipal Corporation area. Primary data collected through administering a questionnaire. The sample size is 200 randomly will be taken for the research. The secondary data collecting from various journals, books, government published manuals, other publications.

Study Area

Greater Warangal Municipal Corporation is the second biggest city in the Telangana state after Hyderabad in terms of size and history, is much older than Hyderabad. The GWMC included tri-cities (Warangal, Hanamkonda and Kazipet) has got a history of 1200 years with heritage left by Kakatiya rulers. The Corporation is located in the State of Telangana (17.9⁰ N, 79.6⁰ E) sprawling in an area of 110 km² (Warangal City Development Plan (CDP) 2011) The GWMC, KUDA and District Administration would work together for visible change and having 0.81 million population according to 2011 census (ISWM 2016). As per the 2011 census of India, Warangal is one of the cities which has seen rapid urbanization from 19% to 28%. The city generates municipal solid waste of 0.251 kg per day per capita, whereas the country's average is 0.11kg (CPHEEO 2014). Pm On average, around 200 to 300 metric tons of waste is produced in the city every day out of which, households, commercial establishment, street sweeping and drains contribute 72%, 13.5%, 5.5% and 9% respectively (ISWM 2016).

In the year 1899, the Warangal Municipality was constituted under the local cess Act. It was declared as a major Municipality in 1934, a special grade municipality in 1959. The city was upgraded to Warangal Municipal Corporation in 1994 under the AP Municipal Councils Act, 1994. Greater Warangal Municipal Corporation is one of the oldest municipalities in Telangana state and was declared as Municipal Corporation on August 18, 1994. The city is included in the Amrut project and smart city by the Central government. The city is known for its heritage and in late 2014 was included in the Government of India's HRIDAY (Heritage City Development and Augmentation Yojana) along with 11 other Indian cities. Warangal is the second-fastest-growing city in Telangana state, after Hyderabad. Warangal City is known for its beautiful lakes, temples and Wildlife. It is very rich in antiques and relics.

Analysis of Solid Waste Data in GWMC

Waste Generation

The waste generated in Greater Warangal Municipal Corporation is estimated to be 360 tons per day, which includes the waste from households, street sweeping, hotels and restaurants, markets, commercial establishments and horticulture debris.

Typically the domestic waste generation in Indian cities ranges between 0.3-0.6 kg and for Warangal it works out to 480 grams per capita per day. In surrounding 42 villages the total estimated waste generated is 43.8 tons/day, calculated based on the empirical formula for per capita waste generation i.e., waste generated = population * 0.21 kg per capita per day. Therefore Greater Warangal generates waste of 403.8 MT every day at 400 grams per capita per day. Based on the data available from some of the similar Indian cities, the density of waste in Warangal is assumed to be 0.3 Kg. In terms of the composition of waste, it is assumed that 40% of the waste generated is bio-degradable and the remaining 60% is bio-degradable.

Primary collection

Primary data collection is the most essential component of SWM service and in Warangal. It comprises door to door collection, street sweeping, collection from bins and open dumping, drains silt etc. While the objective of primary collection of municipal solid waste is to prevent littering and to facilitate compliance with MSW 2016 rules, organized collection of MSW at the household level is being undertaken through door-to-door, house-to-house or community bin service, at regular pre-informed schedules.

Street Sweeping

The GWMC carries out the street sweeping daily. GWMC is divided into 20 sanitary circles, for administrative purposes; there are 16 sanitary inspectors and 33 sanitary masteries/safari karma charms, which are primarily responsible for regular monitoring of sanitation in their respective circles. The Sanitary Inspectors report to Municipal Health Officer, who heads the SWM service in GWMC. In addition, 465 workers are deployed by WMC to undertake street sweeping activities and door to door garbage collection.

Door to Door Coverage

The total number of households residing within municipal limits of GWMC 1,79,948. The number of establishments as per municipal records is 11546. Of these, 96000 households and 485 commercial establishments are estimated to be covered by Door to Door Collection every alternate day. The household-level coverage of SWM service is only 59.7% in WMC. In the case of surrounding 42 villages, it is estimated that only 3484 households out of the total 41000 households have doorstep collection, which is about 7.7%. Therefore, the coverage of Door to Door collection in the CDP area (Greater Warangal) is only 48.4%.

Collection Vehicles and Transportation of Waste

The garbage from the household is collected through tricycles/handcarts and then transferred to community bins/dumper bins. The garbage from community bins/dumper bins across all the wards is collected through tractors/dumper placers and

dumped at the dumping yard. The Corporation has one JCB, 16 dumper placers, 31 tractor-trailers, 277 tricycles and 8 tippers. Table 5 gives the details of the vehicle capacities and the number of trips made by these collection vehicles each day (see table –5).

A common practice observed in Warangal Corporation is that both the household and commercial waste is often dumped in nearby open spaces, which is later collected by tricycles. Even in the surrounding 42 villages, the waste is collected through vehicles such as bullock carts, hand-driven carts, tractors etc. The hand-driven carts are mostly used to collect the waste dumped in open places and gather them in one place. The bullock carts are used to collect the waste from open spaces and dumper bins (about 221 in surrounding 42 villages) and dispose of the waste outside the village which is done once in 15-30days.

The efficiency of Collection of Municipal Solid Waste

Of the total waste of 360 MT generated each day, about 320 MT (91%) is being collected and transported to disposal facilities with the help of various solid waste collection vehicles mentioned above. The collection efficiency of solid waste in surrounding villages is understood to be very less as there is no formal mechanism for daily waste collection. A reconnaissance survey undertaken across 10 surrounding villages reveals that waste is commonly dumped at open places and burnt, which is an unacceptable SWM practice prevalent in the surrounding villages of Warangal city.

Segregation of Waste

Waste segregation practice is not being followed in WMC. The municipal solid waste, which is collected daily by WMC workers, is being dumped at Rampur open dump yard cum disposal site and also in the low lying areas, and similar is the case with surrounding 42 villages. The waste is neither segregated at the source nor the disposal sites.

Complaint Redressal

There is a grievance cell (Written Complaints), Call center and online facilities available for customers to register their complaint. All the complaints are documented and are reported daily to the Medical and Health Officer, who orders the respective ward sanitary inspectors who are responsible to attend to the complaints and solve the problem. It takes about 3 to 4 days to attend to each complaint and rectify it. After the problem is set right signature is taken from the respective HH and people who registered complaints through call centers are given a message. There is no proper maintenance of the number of complaints readdressed in Warangal Municipal Corporation.

Cost Recovery of SWM Services

The total annual operation and maintenance expenditure for SWM services at WMC is estimated to be Rs. 14.68/- crores. This includes the staff costs, fuel costs for

vehicles, repairs and maintenance costs, contract labor costs, chemical costs etc. There is no mechanism of cost recovery through user charges.

Revenue Generation to GWMC through Swatch Bharath Scheme

As a part of National Policy, the “Swatch Bharath Programme” is being implemented in GWMC. But the program has not progressed to the satisfaction of citizens who decided to propagate this program to create more awareness about it and responsibility towards it. It has to be encouraged in view of the Revenue generation capacity because an unemployed person can earn 60/- per house per month wherein, one has to collect garbage from 500-600 households. Under this scheme, the people can get the loan facility to buy the vehicle for garbage collection.

Norms for Sanitation Workers

The Manual on Solid Waste Management by Ministry of Urban Development and Poverty Alleviation 2000, recommends the following norms, which are compared against the existing staff strength into normative strength it is very poor (See table no.6).

Working Norms for Street Sweepers

As per Central Public Health Environmental and Engineering Organization (CPHEEO) estimates that a sweeper can cover 30000 ft of open space per day. Sweeping norms in running meters of the road are as follows:

High-density area – 300-350 meters; Medium density area – 500-600 meters; Low-density area – 650-750 meters.

Considering the variations in the core city and the peri-urban areas of Warangal, an average figure of 600 meters is used to estimate the requirement for Warangal and compare it with the current staff. With a total pucca road length of about 1800 km, Greater Warangal needs about 3000 street sweepers.

Secondary Storage

A waste collector with a handcart/tricycle is not expected to walk more than 250 meters and therefore waste containers for secondary storage should be available within a radius of 250 mts. In high-density areas, one container should be placed for every 5000-10000 residents depending upon the size of the container ranging from 3 cu.m to 7 cu.m. Greater Warangal requires either 95 vehicle containers of 7 cubic meter capacity or about 190 smaller containers of 3 cubic meter capacity.

Transportation of Waste

If a mechanized system of lifting the containers is used, one driver and one sanitation worker per vehicle per shift should be enough to operate the waste transportation system. one worker should be able to connect the containers to the

vehicles and to facilitate the unloading of the vehicle at the transfer station or disposal site. Norms prescribe that a tractor may take six to eight trips to the disposal site in one shift if the distance is less than 5 km, but it may make fewer trips if the distance if the city is congested.

Findings of the Study

The following are the findings of the study. There are Solid Waste Primary collection is grossly inadequate with low levels of household coverage.

1. Partial or negligible segregation of recyclable waste at source;
2. Inappropriate systems of secondary storage of waste;
3. Irregular transport of waste in open vehicles;
4. There is no treatment of waste in GWMC;
5. Inappropriate disposal of waste at open dumping grounds;
6. No encouragement to the private sector to participate in Solid Waste management;
7. Lack of institutional strengthening and human resources development;
8. Ineffective public participation in the segregation of recyclable waste and storage of waste at source;
9. Ineffectiveness of awareness building or direct community involvement;
10. The insufficient staff of Maintenance;
11. Less Disciplinary action on concerned staff;
12. Inadequate vehicles for dumping and Poor Maintenance of vehicles;
13. Lack of Time, Training and Encouragement;
14. Cost benefits analysis and Inadequate Funds;
15. Corruption and Lack of Control on Capital Expenditure;
16. Lack of preparation of detailed Solid Waste Management Plan;

The government will generally have final jurisdiction and responsibility have final jurisdiction and responsibility for overall policy and management of the MSWM system, whether or not the government itself is performing waste management functions. The following participants all have some important relation to waste management and, in some cases significant levels of responsibility for policies or operation.

1. Corporation residential waste generators
2. Corporation area business waste generators
3. Public health and sanitation departments

4. Central and state public works departments
5. Natural resource management agencies
6. National and state environmental ministries
7. Municipal governments
8. Regional governments
9. Private sector companies and corporations
10. Informal sector workers and enterprises
11. Non- governmental organizations
12. Community-based organizations
13. Poor and residents of marginal and squatter area
14. Women/housewives active participation.

Conclusion

With the above finding in view, it is clear that waste, litter, garbage leads Greater Warangal Municipal Corporation urbanism line is a gloomy environmental condition. Since most citizens in unsanitary areas, almost all of them do not have any access to basic urban services of water supply, sanitation and waste disposal. The unhygienic, foul smell conditions make their life measurable. The study findings suggest that the Greater Warangal Municipal Corporation as a local government authority is failing to be accountable and responsive to local urban concerns. Waste management is a crucial issue that needs governmental attention immediately, the practices used in this area to generate waste are too dangerous nations for our services but they could be disasters for children.

At present very little awareness exists amongst the stakeholders. It is crucial to educate people and commence them to adjust practices for reducing, reuse and recycle rather than generating crap. Waste generation and waste reductions reflect many careless economic and social factors. No city or town can adopt recommendations in a vacuum each must services its area wastes and the potential for extending waste reduction. There are many possible ways to implement the general dictum that waste reduction should be the first principle of solid waste management. Humans concern for waste workers must temper the drive to street effectuating. During the period of technical change, there are winners and losers and with the field of materials recovery, there should be attention to there who is involved in this regard. The above discussions, therefore, allows us to conclude that institutional limitations are a major banner to remove waste in service delivery to the people of GWMC. It demonstrates that a good intervention to create local responsiveness on the part of slum areas is essential. Building capacity of the community through raising awareness, giving training, providing incentives, involving all citizens for the services provided in the GWMC could be instrumental.

Table-1
Urbanization Trend in India: 1901-2011

S.N.	Year	Total Population	Urban Population	Percentage	Decadal Growth
1.	1901	2,38,396,327	25,851,873	10.84	0
2	1911	252,093,390	25,941,633	10.29	0.31
3	1921	251,321,213	28,086,167	12.58	8.26
4	1931	278,977,238	35,455,989	11.99	19.12
5	1941	318,660,590	44,153,297	13.86	31.98
6	1951	361,088,090	62,443,934	17.29	41.40
7	1961	439,234,771	78,930,603	17.97	26.41
8	1971	548,159,652	109,113,977	19.90	38.23
9	1981	683,329,097	159,462,547	23.34	46.14
10	1991	844,324,222	217,177,625	25.72	36.47
11	2001	1,027,015,247	285,354,954	27.78	31.13
12	2011	1,210,193,422	377,105,760	31.16	34.42

Table-2
State Wise Generation, Collection and Treatment (February 2016)

S.N.	States	Generated (TPD)	Collected (TPD)	Treated (TPD)	Land filled (TPD)
1	Andaman & Nicobar	70	70	05	0
2	Andhra Pradesh	4760	4287	3402	0
3	Arunachal Pradesh	116	70.5	0	0
4	Assam	650	350	0	0
5	Bihar	1670	0	0	0
6	Chandigarh	370	360	250	0
7	Daman Diu & Dadra	85	85	Nil	0
8	Delhi	8370	8300	3240	0
9	Goa	450	400	182	0
10	Gujarat	9988	9882	2644	0
11	Haryana	3103	3103	188	0

12	Himachal Pradesh	276	207	125	150
13	Jammu & Kashmir	1792	1322	320	375
14	Jharkhand	3570	3570	65	0
15	Karnataka	8697	7288	3000	0
16	Kerala	1339	655	390	0
17	Lakshadweep	21	0	0	0
18	Madhya Pradesh	6678	4351	0	0
19	Maharashtra	22,570	22,570	5,927	0
20	Manipur	176	125	0	0
21	Meghalaya	208	175	55	122
22	Mizoram	552	276	0	0
23	Nagaland	344	193	0	0
24	Orissa	2374	2167	30	0
25	Puducherry	495	485	0	0
26	Punjab	4105	3853	350	0
27	Rajasthan	5037	2491	490	0
28	Sikkim	49	49	0.3	0
29	Tamilnadu	14,500	14,234	1607	0
30	Tripura	415	368	250	0
31	Telangana	6740	6369	3016	3353
32	Uttar Pradesh	19180	19180	5197	0
33	Uttarakhand	918	918	0	0
34	West Bengal	9500	8075	851	515
35	Chattisgarh	1896	1704	168	0
	Total	1,41,064	1,27,531 – 90%	34,752 27%	4,515

Table – 3

Sources of MSW Generation in Warangal Municipal Corporation

Sl. No.	Source	No of Units
1	Area of Greater Warangal Municipal Corporation	406.87 Sq.kms
2	Present Population (2011 Census)	811844
3	Municipal Divisions	58
4	Municipal Circles	02
5	No. Of Households (census 2011)	179948
6	Length of the Roads (KM)	2468.3 km
7	Length f the drain (KM)	4226 km
8	Commercial Establishments	5951
9	Hotels/Lodges	275
10	Restaurants/Dhaba/Roadside eateries	181
11	Institutions	636
12	Offices	405
13	Fish/chicken market	40
14	Slaughter House	3
15	Hospital/Nursing Homes/Diagnostics	1044
16	Wholesale Vegetable/Fruit Market	14
17	Celebration House (Banquet)	16
18	No. Of notified Slums	94
19	No. Of Non-notified Slums	88

Table – 4

Waste Generation in GWMC (Tons/Day)

Sl. No.	Sources	T.P.D.
1	Waste Generation –GWMC	
2	Waste Generation Households	180
3	Waste Generation by street sweeping	170
4	Waste Generation by hotels and restaurants	1
5	Waste Generation markets	0.9
6	Waste Generation commercial establishments (institutions)	5
7	By other sources (eg debris, horticulture waste.etc)	3
8	Total Waste Generation in WMC	360

Table - 5
Collection vehicles used for transportation of waste in GWMC

Sl. No	Type of vehicles	No. of vehicles	Capacity	No. of trips
1	Dumper placers	16	3MT	3
2	Tricycles	277	50KG	0
3	Tippers	8	5MT	3
4	Tractors trailers	31	3MT	3
5	Mini tippers	4	1MT	3

Table – 6
Norms for Sanitation Workers

SLNo	Name	Staff/ population	Normative Strength	Existing Strength	GAP
1	Municipal Health Officer	1:500000	1	1	0
2	Sanitary Officer	1:100000	0	0	0
3	Sanitary Inspector	1:50000	15	16	0
4	Sanitary Sub-Inspector	1:25000	0	0	0
5	Sanitary Supervisor	1:12500	60	33	0
6	Sanitary Worker(part time)	1:1000	750	465	0
7	Sanitary worker(street sweeping)	1:600m	0	0	0

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