IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

Augmentation of Municipal Solid Waste Management in Hyderabad City

Dr. R. Premsudha[1], M. Kavyasri[2], M. Sreeharsha[3], V. Sathwika[4], Srija Natraj[5], B. Anusha[6]
[1]Professor, [2,3,4]UG students, [5,6]Assistant Professor, Department of Civil Engineering
TKR College of Engineering and Technology, Hyderabad, India
rpremsudha@gmail.com

Abstract: *Enormous amount Municipal solidwaste is generated daily all over the world because of the life styles of people. Both developed and developing countries facing so many problems for proper collection, transport, treatment and disposal of municipal solidwaste (MSW). Even though proper collection and transport of municipal solidwaste are implemented during the disposal, recovery and treatment of those wastes also causes various impact on environment and human health. This study was throw the light on impact of solidwaste is continuous problem and affect all the environmental precious resources(soil, water & air) also cause serious threat to human beings, plants and animals unless every individual not take any step to reduce their solidwaste generation rate. All the state government and central government is taken so many actions to reduce the impact of municipal solidwaste at oneside but failed to change the people mindset to avoid unnecessary increase of solidwaste generation and dispose that properly. This project was carried out to gain through knowledge about Hyderabad integrated municipal solidwaste management (HIMSWM) plant at jawahar nagar to study the entire process of municipal solidwaste treatment done by Ramky group of limited.*

Keywords: Hyderabad Integrated Municipal Solidwaste Management, Municipal solidwaste

Objective of the Study

- To study the total solidwaste generation, collection, transfer and treatment in Hyderabad
- To study the overall impact of municipal solid waste around dump yard and suggest suitable sustainable solutions to reduce the environmental impact
- To collect the information about common problems facing by peoples around HIMSWM plant due to implementation of various treatment process.

I. INTRODUCTION

India being an agricultural country has a present population of approximately 1,405.2 million with 29 states and 7 union territories. The hassle of SWM in India is growing noticeably because of rapid urbanization and population boom. Out of the total waste generated from the industrial, residential, commercial, and agricultural areas a massive amount of waste is generated from residential areas comprising municipal waste.

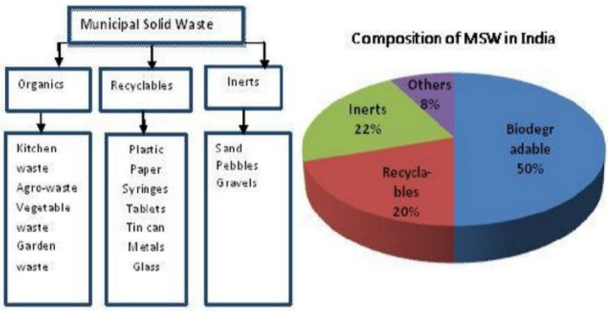

Fig. 1. Composition of MSW in India

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

This municipal solid waste is a composition of both degradable and non-degradable materials comprising 30-50% organic matter, 7-10% recyclables, and the rest inert matter is shown in fig 1. As per Central Pollution Control Board(CPCB) survey, 366 cities in India generated 31.7 million tons of waste in 2001 and are presently generating 147,623 metric tons, a 50% boom in one decade. It's far anticipated that these 366 cities will produce 240 million tons per day (TPD) of MSW by 2040 Muncipal Solid Waste Generation Per day In Indian Cities is presented in Table 1 & Fig 2.[1,8]

City	Waste generation (kg/capita/day)	Kilo tonnes per year	Tonnes per day
Delhi	0.57	2161	5920
Greater Mumbai	0.45	1941	5320
Chennai	0.62	1108	3035
Kolkata	0.58	968	2650
Hyderabad	0.57	798	2185
Bangalore	0.39	609	1670
Ahmedabad	0.37	475	1301
Pune	0.46	428	1172
Kanpur	0.43	401	1098
Surat	0.41	365	1000

Table 1: Muncipal Solid Waste Generation Per Day In Indian Cities

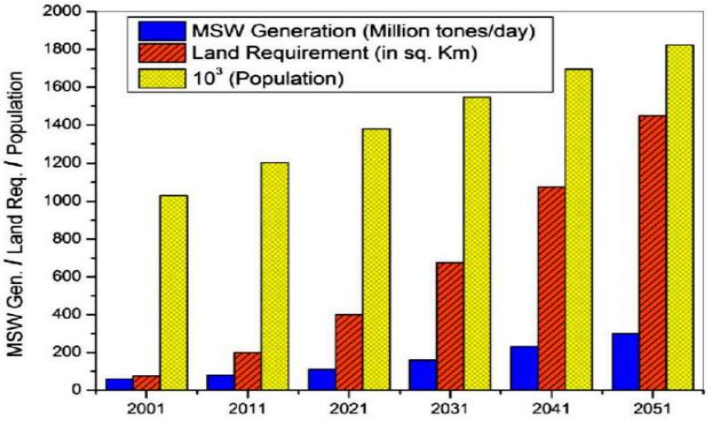

Fig. 2. MSW Generation rate

1.1 Status of MSWM in Telangana

The Telangana state generates roughly 5000-6000 TPD on average (excluding the Greater Hyderabad Municipality Area), while trash generation per capita in the ULBs ranges from 0.2-0.4 kg/capita/day. Waste is expected to grow at a pace of 5% per year, with a collection efficiency of 80-90 percent. The composition of municipal solid waste as a whole is.Organic content: 50-60%Inorganic and recyclables: 25% (paper 8.13, plastic and rubber 9.22 %, metal and glass 1 to 1.5 %, rags 4 to 4.5 %, other 4%).Remaining inert material: (20-25%)The state government has dedicated the entire Rs. 374 crore funding from the 12th Finance Commission to MSWM. The entire sum was used to improve the SWM infrastructure.[5,6].

1.2 Status of MSWM in Hyderabad:

Hyderabad has the most technologically advanced and environmentally sustainable MSW collection and transport system in India carried out by HIMSW Ltd. (Hyderabad Integrated Municipal Solid waste. The Telangana government initiated advanced garbage collection, transport vehicles, transfer stations, and treatment plants. The main objective is to adopt the best municipal solid waste management system in Hyderabad. It constitutes a network of fully motorized secondary collection and transport points (SCTPs) located throughout the city, with transfer stations located in each municipality[4,6].

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

II. MATERIALS AND METHODS

Hyderabad is the sixth largest city in India, with a population of 10.2 Million (1.02 Crore) is capital of Telangana state. Currently, 5000 metric tons(MT) of municipal solid waste is generated in the city. This waste is collected by the municipal authorities with the help of tricycle carts and dumped into the three major collection points which are located in Yousufguda, Imlibun and Lower Tank bund. Eventually, waste collected from all the three collection points in the city are transported through trucks and dumped into the municipal dumpsite of Jawaharnagar without proper segregation and recycling process. The project comprises a network of 17 transfer stations, 90 secondary collection and transportation points.

2.1 Description of the Hyderabad Integrated Municipal Solid Waste plant

. The present study was conducted within the premises of Hyderabad Integrated MSW processing and disposal facility (HIMSW), which handles approx. 5000-6000 tons of MSW on a regular basis. The total area of Jawahar nagar village municipal solid waste treatment plant is 350 acres from which the area occupied by the waste at present is 182 acres. The area belongs to Medchal district of Telangana with coordinates between 17°26’ N to 17°34' N latitude and 78°32.5’ E to 78° 40' E longitude. The map of Medchal district of Jawahar Nagar treatment plant and municipal solidwaste generation rate is given as per circle and zone wise are shown in Fig-1& Table -2&3.

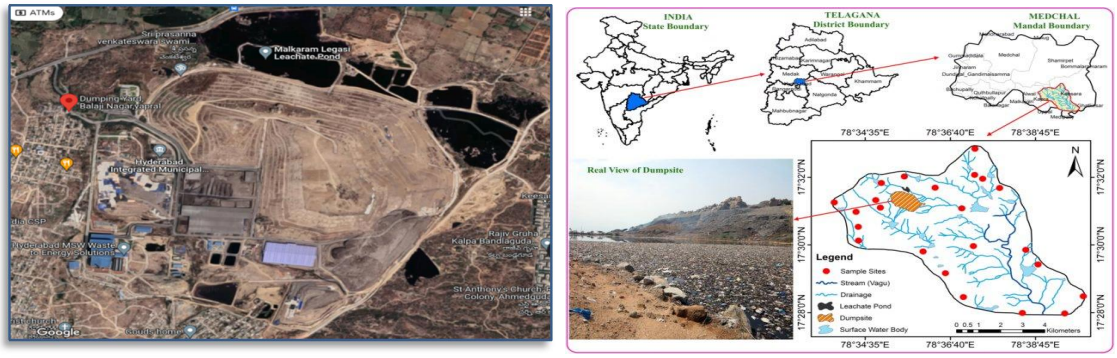

Fig 3. Layout of Jawaharnagar treatment plant

S.No	Type of Waste	Waste Generated (MT/Day)	Waste Composition(%)
1.	Domestic household waste	1870	37.18
2.	Commercial establishments waste	350	6.95
3.	Hotels & Restaurants	666	13.24
4.	Institutional waste	125	2.48
5.	Parks & Gardens	69	1.38
6.	Street sweeping waste	325	6.47
7.	Waste from drains	175	3.47
8.	Markets	479	9.52
9.	Temples	35	0.70
10.	Chicken,Mutton,Beef,Fish stalls	164	3.26
11.	Cinema halls	15	0.30
12.	Function halls	88	1.74
13.	Hospitals	35	0.69
14.	Construction & Demolition waste	635	12.62
15.	Total	5030	100.00

Table -2 & 3 Total Solid waste generation in GHMC during 2020 as per circle and zone wise

ZONE	Circle No	Quantity of Solid waste MTPD
East	Circle 1: Kapra	154

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

	Circle 2: Uppal	135
	Circle 3: LB Nagar	389
South	Circle 4	719
	Circle 5	351
	Circle 6: Rajendra nagar	204
Central	Circle 7	446
	Circle 8	68
	Circle 9	450
	Circle 10	511
West	Circle 11: Serilingampalli-(i)	264
	Circle 12: Serilingampalli-(ii)	264
	Circle 13: Ramachandrapuram	121
	Circle 14: Kukatpalli	351
North	Circle 15: Qutbullapur	217
	Circle 16: Alwal	145
	Circle 17: Malkajgiri	208
	Circle 18: Secunderabad	296
	Total	5030

2.2. Quantity of waste generated in Hyderabad 2020

The maintenance of health and sanitation is one of the primary obligations of the GHMC. The GHMC spread over an area of 625 sq km and has a population of 87 lakh is striving to ensure better sanitary upkeep in Hyderabad city with the help of a huge workforce and huge fleet of vehicles for transportation of daily garbage to the tune of 5000 to 6000 MT's per day generating in the city. GHMC consists of No. of zones:5, No.of circles:18, No.of Parliamentary Constituents:5, No. Of Assembly Constituents:24, No, of Election ward:1150MSW Generation:5000 tons per day.

2.3. Solid waste collection and its transportation to Jawahar Nagar Dumping site.

There are (3) types of garbage collections in Hyderabad City:

1. Primary Collection: - The garbage will be collected from households with (2000) Swachh Autos and the same will be dumped at nearby Transfer Stations and there are some open points in various circles and the same will be lifted through open small tippers from open points to Transfer Station. In addition to this, at present there are about 2169 of garbage dumper bins in all circles.
2. Secondary collection: Garbage will be collected to the tune of 4500 MT every day and the same will be shifted through Swachh Autos, Small Tippers & Dumper Places to (21) Transfer Stations in all circles of city.
3. Tertiary: - The collected garbage at Transfer Station will be shifted through 10 Ton & 25 Ton Tippers to Dumping yard situated at Jawahar Nagar, Keesara Mandal, Ranga Reddy District.

GHMC has introduced “Swachh Auto” in November 2015 for collection of garbage directly from the households with an intention of reducing number of dust bins in residential localities there by reducing burden on garbage transport vehicles. These Swachh Autos were purchased by the GHMC and allocated them to unemployed youth by registering vehicle on their name with a condition that GHMC pay’s EMI of each Swachh auto in the range of Rs.6500 to Rs.7000/- for six years to the Auto dealer, in turn Swachh auto collects garbage from each household and transport’s collected waste to nearby transfer station. Swachh Auto collects Rs.50/- per month for each hold, and with these amounts only Swachh Auto must operate on its own including fuel and labour charges etc. After Six years youth who operates Swachh Auto automatically becomes the owner of the auto. By these operation of Swachh Auto’s GHMC have reduced Diesel consumption for garbage transport vehicles, Types and Quantity of Vehicle used for solidwaste transportation is given in Table-4.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

2.4 Details of Solid waste Transportation to M/s HIMSW plant, Jawahar Nagar

The transport section, GHMC is dealt with arrangement of vehicles such as 25 Ton Tippers, 10 Ton Tippers, 6 Ton Tippers, Dumper placer vehicles, skid steer loaders, back-hoe loaders, Front End Loaders for shifting of garbage from various localities of GHMC to Transit Point and then from Transit point to Jawahar Nagar Dumping Yard, for final treatment and safe disposal. The GHMC is having (389) different types of sanitation vehicles utilizing for transportation of garbage and the details of sanitation vehicles are presented in table-2. Presently, there are 3 Parking Yards namely Kawadiguda, Malakpet and Khairatabad parking yards, where the GHMC Transport vehicles are parked and operated. GHMC officials have fixed Job chart (Log cards) for each transport vehicle to collect garbage from specifically allotted dust bin and then transport it to transfer stations. According to this Job chart each vehicle has to make 1 or 2 trips daily/alternatively to collect garbage from the allotted dust bin and then dumping at the respective transfer station. After collecting garbage at transfer stations from residential/business localities through medium transport vehicles, GHMC again transport this garbage to Integrated Municipal Solid Waste Project Jawahar Nagar through heavy transport vehicles for further processing and safe disposal.

Table 4: Types and Quantity of Vehicle used for solidwaste transportation

Sl.no	Type of vehicles	No of vehicle	Total no of Vehicels
1	**Heavy Vehicles:**	41 Nos. of 25 Ton Tippers	129
		43 Nos. of 10 TonTippers	
		45Nos.of Big Compactors	
2	**Medium Vehicles:**	Dumper Placer vehicles	139
3	**Small Vehicles**:	6 Ton Tippers (out of 121 vehicles some vehicles are utilizing for bulk garbage, enforcement, shifting of plants, central emergency etc.,)	121
		Total:	**389**

The municipal solid wastes that received for treatment at Integrated MSW Project site in Jawaharnagar, Ranga Reddy District were counted as number of trips daily at the processing and disposal facility through weighbridges which are linked to GHMC. Independent Engineer (EPTRI) monitors the entire processing and disposal activity. It is observed that these vehicles are electronically recorded time wise and weight wise at reception of MSW project. Collection & Transportation vehicles owned by GHMC and Treatment process of HIMSWM is shown in fig-4

Fig 4. Collection & Transportation vehicles owned by GHMC

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

III. RESULTS AND DISCUSSION

Various treatment Process of HIMSWM is shown in fig.7.

3.1 Weighbridges

The primary step in the municipal solid waste treatment plant is the Weighbridges section which consists of 5 units having a capacity of 50 MT each. Registering the number of vehicles and their weighing process is carried out with the help of fully automated software. They weigh almost 5000-6000 tons of municipal solid waste on daily basis

Fig 5. Weighing Bridges Fig 6. Acceptance Material Conveyor

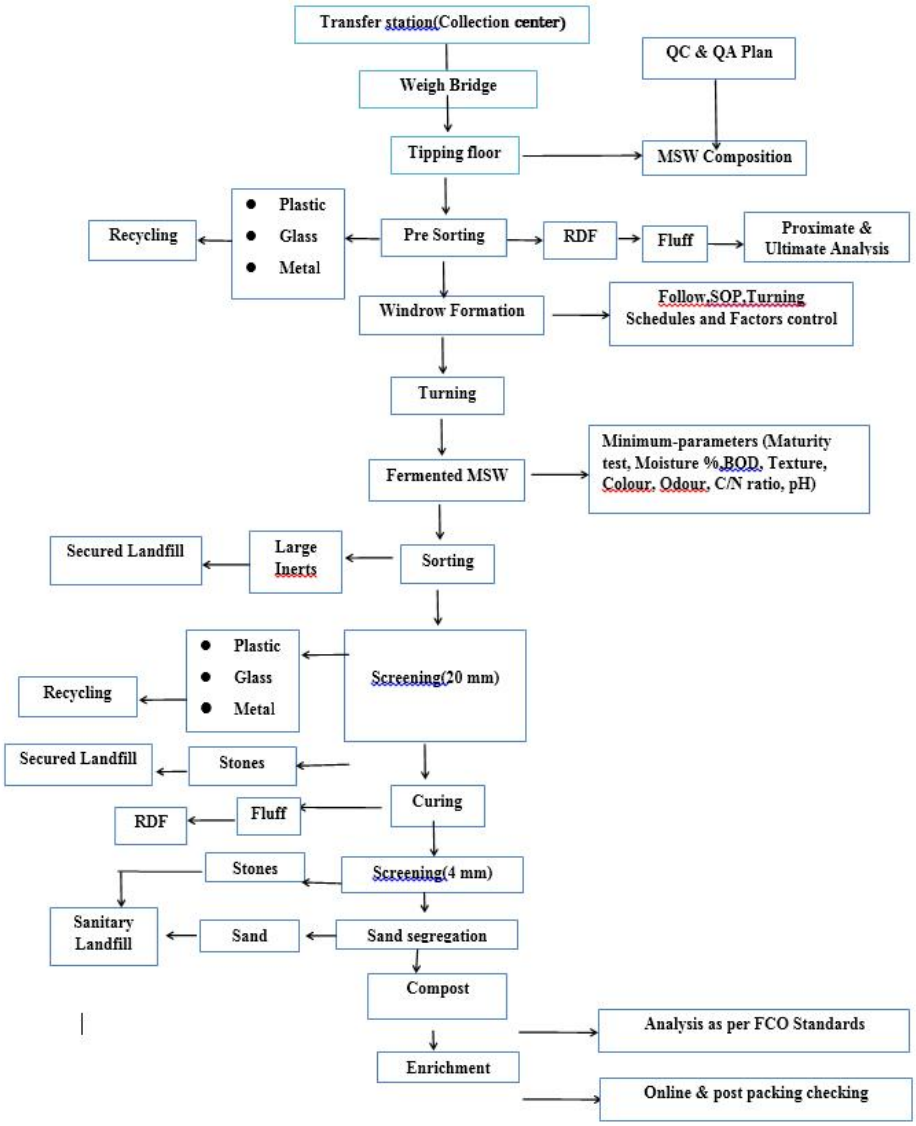

Fig 7. HIMSWM process flowchart

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

3.2 Pre-sorting and Segregation

The second method in the municipal solid waste treatment plant is pre-sorting which has an area of 4000 sq.m where the waste is dried for up to 1 week to remove the leachate quantity present in the waste. After removing the leachate through drain pipes, the waste gets dried. This dried solid waste is sent to the pre-sorting section which is equipped with trammels. Trammels consist of 2 mesh size sieves, they are 100 mm and below 100mm conveyor.100mm acceptance material is composted using the windrows composting method whereas 100mm rejects material is further processed to generate Refuse Derived Fuel which is stored on HDPE lined area.

3.3 Composting

The Windrow Composting segment is a 28,125 sq m impermeable platform where heaps of organic waste are aerobically dried, and continual overturning and transfer of the compost is accomplished once a month with the help of cranes. Different heaps mature at different rates, which are then transported to the monsoon portion, which has a 9000sq.m shed with two trammels for further separation of 35mm and 16mm screens. The smaller particles are sent to the curing shed, while the bigger particles are sent to the landfill as total trash or to the RDF section for electricity production. The high-quality, fine-textured composted material is now stacked in piles. It produces a nutrient-rich, safe by-product, which is eventually delivered to fertilizer companies.

Figure 8: Windrow processing (Windrows, rejects, finished product) Packaging

3.4 Refuse Derived Fuel

RDF plant has a capacity of 2040 TPD. RDF material is being stored in the HDPE-lined storage units which are built in an area of 3 acres. The primary shredder has a capacity of 50 TPH with sieve size 80- 90 mm size rejects separated from 35mm size particles. These 80-90 mm rejects comprising combustible materials are then dried, baled, and then finally burnt to produce electricity

Fig 9. RDF Storage Fig 10. Segregated RDF

3.5 Scientific Landfill with Leachate Collection and Treatment System

Leachate is produced when rain or storm water filters downward through a landfill, carrying dissolved materials from the decomposing wastes. It depends on the characteristics of the wastes that the landfill contains, which may be relatively harmless or extremely toxic. Here the landfill is equipped with a leachate collection and treatment system having a capacity of 735 TPD established with RCC drains to pass the leachate from the landfill to storage ponds spread over 2kms. The aerated ponds are built with a capacity of 10000 cum. There are 4 ponds: pond 1 has an area of 2657 sq m has

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

a capacity of 5581 cum, pond 2 has an area of 2350 sq m with a capacity of 4301 cum, pond 3 has a capacity of 2805 sq m with a capacity of 6171 cum, pond 4 has a capacity of 4291 sq m with a capacity of 11586 cum.

Fig 11. Open Landfill

Fig 12. Leachate Pond

Fig 13. Leachate treatment plant

3.6 Bio-Methanation

Bio-Methanation is a pre-treatment process that involves the anaerobic digestion of organic waste to produce biogas and electricity. The thermophilic procedure also generates biogas by dewatering the digested waste.

3.7 Waste to Energy

The Pusher Grate technology is used in the HiMSW ltd. waste-to-energy plant, which has a capacity of 19.8 MW. The plant decreases waste volume by up to 90%, leaving just 10% inert / ashes that must be landfilled. The treatment of flue gases generated during the combustion process is handled by the air pollution control (APC) system.

3.8 Recycle of Plastic

Mechanical recycling is an environmentally friendly process that recycles 60% of both industrial and urban plastic waste. On the one hand, pure grade plastic scrap (trash) comes directly from the industry; on the other hand, post-consumer plastic garbage, which is included in MSW, is a problem issue. The capacity of this portion is 600 TP.

Fig Sorted Recyclables Fig Recycling of plastic

IV. CONCLUSION

The present study was carried out to gain knowledge about the municipal solidwaste management. So many researchers studied municipal solidwaste management and its problems associated in and around Indian cities and allover world. As our part of our curriculam we selected this work to know practical difficulties and proper management of municipal solidwaste in Hyderabad. Enormous amount was generated from various sources it is going on increasing its varies based on season. From this study we observed more generation of organicwaste is more due to more hotels, markets, etc. now a days there is increase of E-Waste also leads to major environmental issues. All the process for proper management of municipal solidwaste management was taking atmost care to recover materials from waste is properly planned by Ramky groups at different levels, more technical, non technical staff are involved in HIMSWM. while handling waste is difficult to human.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, June 2022
Impact Factor: 6.252

REFERENCES

[1]. B. Soujanya Kamble1, Praveen Raj Saxena, (2017) ,Environmental Impact Of Municipal Dumpsite Leachate On Groundwater Quality In Jawaharnagar, Rangareddy, Telangana, India Appl Water Sci 7:3333–3343 ,DOI 10.1007/s13201-016-0480-6.

[2]. SoujanyaKamble,(2016),Environmental impact of municipal dumpsite leachate on groundwater quality in Jawaharnagar, Rangareddy, Telangana, India,Appl Water Sci DOI 10.1007/s13201-016-0480-6.

[3]. Prashanth Narayan ,(2005),Case Study on effects of Solid waste management by landfill sites in Bangalore,International Journal of Future Generation Communication and Networking Vol. 13, No. 3, (2020), pp. 2935–2945.

[4]. Victor Fernandez Nascimento (2019),Municipal solid waste disposal in Brazil: improvements and challenges,Int. J. Environment and Waste Management, Vol. 23, No. 3.

[5]. Odile Schwarz-Herion,(2008),On Successful Municipal Solid Waste Management In Industrialized Countries By The Example Of Karlsruhe City,Germany, International journal et emerging technology and advanced engineering website,volume 3,Issue.

[6]. Vamshi Krishna,(2015),Municipal Solid Waste Management using Landfills in Hyderabad City,International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS020842,Vol. 4 Issue 02.

[7]. Sarala C (2012),Assessment of Groundwater Quality Parameters in and around Jawaharnagar, Hyderabad,International Journal of Scientific and Research Publications, Volume 2, Issue 10, October 2012 1 ISSN 2250-3153.

[8]. Konda Durga Sindhu Sree*, Surya Narayan Dash* and Anagani Leelavathi Biological Remediation of the Municipal Solid Waste Leachate - A Case Study of Hyderabad Integrated MSW Limited, Nature Environment and Pollution Technology No. 1 ,An International Quarterly Scientific Journal,. 19 pp. 379-383 2020 p-ISSN: 0972-6268

[9]. **R. PremSudha** R. N. Uma, and K. Murali, 2016 "Analysis Of Physico Chemical Characteristics of Soil and SQI Around Municipal Solidwaste Dumpyard In Vellalore-Coimbatore Tamilnadu, India" International Journal of Chemical Sciences Volume 14, Issue 4, pp. 3265-3276. ISSN 0972-768X-

[10]. .http://mzuir.inflibnet.ac.in/bitstream/123456789/1094/1/ALBERT%20VANLALLIANTLUANGA,%20EVS .pdf

[11]. Pervez Alem (2013),Impact of Solid Waste on Health and The Environment,Special Issue of International Journal of Sustainable Development and Green Economics (IJSDGE), ISSN No.: 2315-4721, V-2, I-1, 2013.

[12]. Wilson Uzochukwu Eze (2021),Plastics waste management: A review of pyrolysis technology,AIMS Clean Technologies and Recycling ,Volume 1, Issue 1, 50–69.

[13]. Sadegh Papari (2021),Pyrolytic Conversion of Plastic Waste to Value-Added Products,*Materials*2021, *14*, 2586.

[14]. Ram Jatan Yadav [2020],Pyrolysis of Waste Plastic into Fuel,International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878 (Online), Volume-9 Issue-1, May 2020.

[15]. Bureau Of Indian Standards BIS 10500-1991& Amendment 1993, Indian Standard Drinking Water Specifications , New Delhi.

[16]. Solid Waste Engineering Principles and Management Issues By George Tchobanoglous, McGraw HILL, 2000.

[17]. Bureau Of Indian Standards BIS 1390-1983,'Methods of sampling and test (physical and chemical) for water and wastewater, Part 60 Flouride [CHD 32: Environmental Protection and Waste Management.