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Research Article

A Case Study On Solid-Waste Management In Bilaspur City, Chhattisgarh, India

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ABSTRACT

Now days, Solid Waste Management (SWM) has become the most discussed and inevitable issue in almost all government municipal bodies of India. The discipline involved in the control of the generation, collection, storage, transfer, processing, and disposal of solid waste (Organic and non-organic waste) can be referred to as solid waste management. This SWM involves lot of resources of every civic bodies and still very few in country are able to manage the system effectively. Under the "Swatchha Bharat Mission" an Indian government initiative, it was urge to every corporation to activity participate. But still lot of work is needed to carry out in this area. As case study Bilaspur Municipal Corporation's (Chattisgarh) solid waste management practices are represented. In detail data is collect from the authority of Bilaspur Municipal Corporation for study the existing scenario of all eight zones during the year 2020-21. After critical analysis some remedies are suggested for improving the current SWM situation. Environmental Impact Assessment (EIA) is strongly recommended to authority to check pollution level and other health issue due to improper SWM.

I -INTRODUCTION

The issue of municipal solid waste management (MSWM) in major urban areas has gained attention in India particularly during the most recent decade. Waste management includes the collection, transportation, processing, recycling or disposal and monitoring of waste materials. It identifies with declined materials delivered by human movement, and is by and large attempted to lessen their impact on wellbeing, condition or style [1,2]. The essential wellsprings of urban solid waste incorporate waste created in local, institutional, commercial, recreational and civil administrations. The local wastes are high in amounts and differ with time and season. It is for the most part involved organic and inorganic constituents. Presently a day the amount of organic waste is diminishing and the nature of metals, paper and plastics is expanding, demonstrating that there is developing inclination for utilization of bundled nourishment lately in current society [3,4]
The present arrangement of solid waste management in India lacks proper implementation as far as treatment strategies and procedures are concerned. Unlawful dumping is a major issue of noteworthy worries as to human wellbeing, security, and personal satisfaction when all is said in done urban social orders. A poor collection and disposal practice is another issue. It draws in and advances locales for the reproducing bugs, rodents and pathogens that can cause and transmit different ailments in the public eye [5,6].

II- STUDY AREA - BILASPUR CITY

Bilaspur is a city in Chhattisgarh, situated110 km north of the state capital, Raipur. It is located on the bank of the river"Arpa" which begins from the high slopes of the Maikal-Ranges of Central-India. With a populace of 467,946, it is the second-biggest city after Raipur city. Bilaspur city is the business center of north east Chhattisgarh area. It is likewise a significant city for the Indian railways, as it is the head-quarter of south-east-central railway-zone and the central station of south eastern coalfields ltd. Bilaspur city is partitioned in

to 53 wards (Currently increased to 70 wards). Bilaspur city is governed/represented by Municipal Corporation which goes under Bilaspur Metropolitan Region. City is the second biggest city in the territory of Chhattisgarh, arranged at 113 KMs (70.2 Mile s) north side of the state capital, Raipur. Geographically the province of Chhattisgarh can be separated into three wide regions. The Northern slopes/hills, the Central-Plains, and Bastar-Plateau. Bilaspur is in the northern side of Central fields. Its cardinal point is 22'05" N and 82'25" E longitude with an average elevation of 264 meters (866 ft) from sea level.

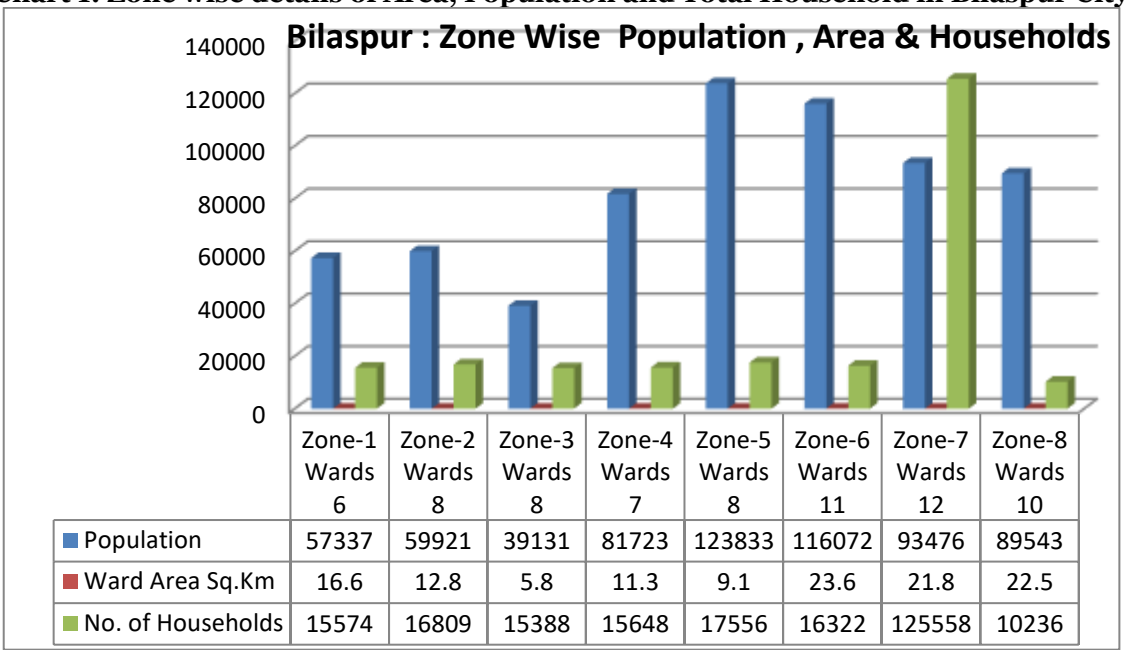
III- Current Scenario of Municipal Solid Waste Management in Bilaspur :

The information of solid waste has been gathered from Municipal Corporation Bilaspur, Environmental Control Board Office, Health Office Bilaspur city and field study. Populace information has taken from the distribution of the fundamental measurable division of Municipal Corporation in Bilaspur city. The field study information gathered for some example unit as it were. There gathered ward Boundary Map of Municipal Corporation. Area discovered review of India top sheets. A lot of polls intended for the private, Commercial, Industrial and their working staff were used to acquire information about the solid waste administration framework in Bilaspur city. Thereutilize essential and auxiliary information are to be considered for city. Field Survey was additionally led to decide the numbers and creation to show status of city waste.

1. Population Data- Total population of Bilaspur after current expansion of city duering year 2020-21 was reported to be 5, 18,481.Bilaspur demonstrated a most extreme decadal development rate during 1951-61 and in this way a progressive increment in the development rate 121.76 %. Than development rate in 1971 is 10.58 % , 1981 is 53.42%, 1991 development rate 22.25% Census 2001 is 52.87% and a low pace of 2011 is 29.96% Respectively.

Once again high increment in population, about 2.28 lacks has been observed in the year 2020-21 because of the expansion of 15 wards (from 55 to70 wards) after current delimitation of Bilaspur Municipal Corporation administrative limits. Chart 1 shows the zone wise details of area,population and total households

Chart 1: Zone wise details of Area, Population and Total Household in Bilaspur City

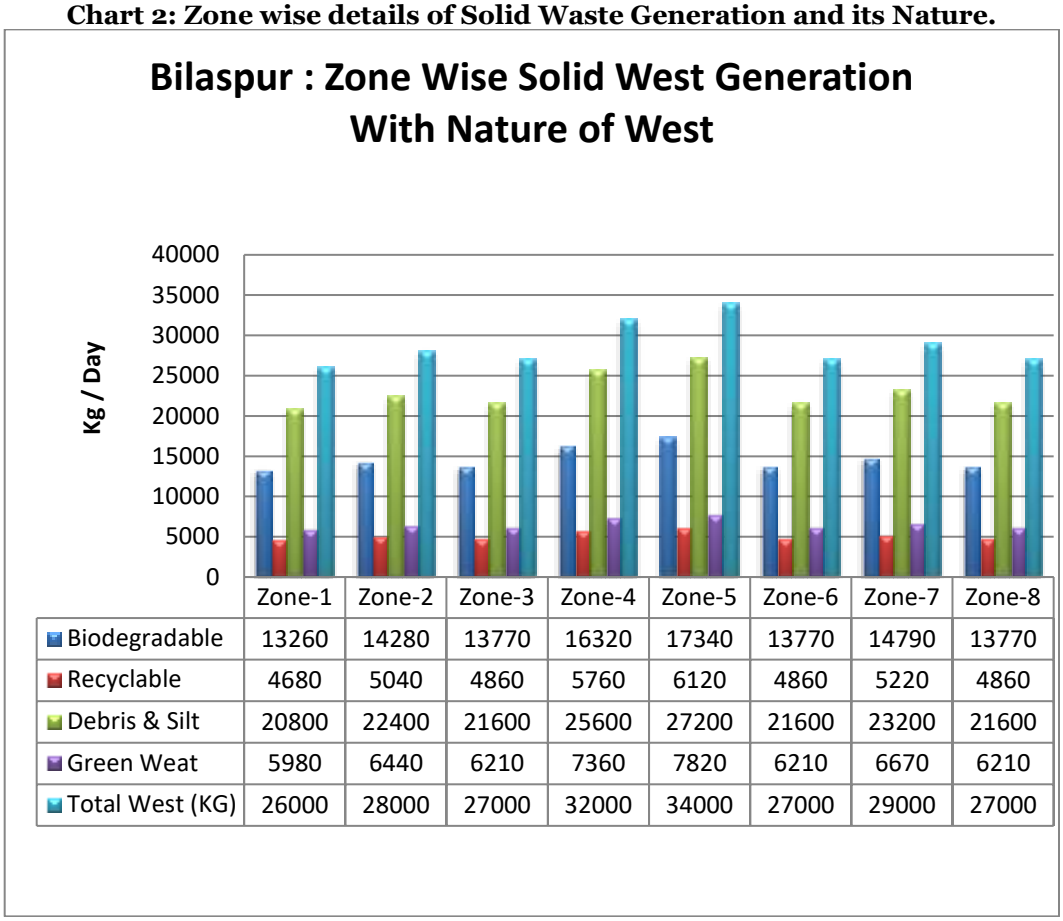


	Zone-1 Wards 6	Zone-2 Wards 8	Zone-3 Wards 8	Zone-4 Wards 7	Zone-5 Wards 8	Zone-6 Wards 11	Zone-7 Wards 12	Zone-8 Wards 10
Population	57337	59921	39131	81723	123833	116072	93476	89543
Ward Area Sq.Km	16.6	12.8	5.8	11.3	9.1	23.6	21.8	22.5
No. of Households	15574	16809	15388	15648	17556	16322	125558	10236

Source: Municipal Corporation Bilaspur

2. Generation of Waste in Bilaspur City- Bilaspur city has in all 70 wards. These are divided in eight Zones. Each zone consists of min.6 to max.12 wards. Total waste generation in Bilaspur municipal corporation area is about 230 MT/day, out of which 49.3% is biodegradable (dry), 26% recyclable 14.5 % green (wet) and 9.5% debris & silt. Solid waste generation of zone-5 has been max due to heigh population density i.e. 34,000Kg/day of Total Waste of city with 53%biodegradable, 18% recyclable, 8% debris and silt, 23% green and vegetable waste. The green waste is maximum in zone 5,7 & 2 due to vegetable markets as compared to other zones. Progressively business exercises including us the utilization of plastic, glass, and paper, cardboard and metal sheets has comprised 16-29% waste as recyclable in central zones . About 51% of the all out strong waste gathered from whole city is biodegradable preparing the vitality potential, whenever outfit with anaerobic absorption, gasification or palletization advances. Chart2 gives the Zone wise details of Solid Waste Generation and its Nature.

Chart 2: Zone wise details of Solid Waste Generation and its Nature.



Source: Bilaspur Municipal Corporation SWD

3. Waste Collection-Total Generation of waste in Bilaspur is 230 MT/day out of which 185 MT/day is gathered by the Corporation solid waste management authorities and 45 MT/day stay uncollected which establishes about 20% of the waste created that remaining parts uncollected day by day. It causes the natural issues and influences human culture numerous ways. Table 1 gives Zone wise details of Solid Waste Collection .

Table 1: Zone wise details of Solid Waste Collection and its Nature.

Zone	Solid waste Generated (MTD)	Solid Waste collected through Vehicles/ Carts through door to door collection (In MTD)	Number of vehicles/ Carts	Labour
Zone 1	26	1.9	5	6
Zone 2	28	1.2	4	7
Zone 3	27	2.3	6	9
Zone 4	32	2.0	6	9
Zone 5	34	3.2	8	11
Zone 6	27	2.6	6	8
Zone 7	29	3.4	8	6
Zone 8	27	1.8	4	6
Total	**230**	**18.4**	**47**	**62**

Source: Bilaspur Municipal Corporation SWD

4. SW Institutional Arrangement -Zone 1, 2, 6, 7 & 8 has been wide spread and generates high quantity of solid waste, hence those zones requires involvement of 159 personal in its management. Zone 4 & 5 are heighly dense and requires less man-power (52). The total work man-power involved for solid waste collection work is 204 and is controlled by the one department incharge of solid waste managementunit. Table2 shows zone wise manpower requirement.

Table2: Total Institutional man-power involved for solid waste collection and transportation in each zone of the Bilaspur city.

Zones:	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Department in charge of SWM in the city								
Total no. of supervisory staff	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3	CSI-1 SI-3
Total no. of subordinate staff	Jamadar-2 Bigari-22 Driver-3	Jamadar-3 Bigari-19 Driver-3	Jamadar-4 Bigari-21 Driver-4	Jamadar- 4 Bigari-12 Driver-5	Jamadar- 5 Bigari-13 Driver-5	Jamadar-4 Bigari-24 Driver-6	Jamadar-4 Bigari-17 Driver-4	Jamadar-4 Bigari-19 Driver-4
Total 1+204	**31**	**29**	**33**	**25**	**27**	**39**	**29**	**31**

Source: Bilaspur Municipal corporation.SWD

5. Details of collection System, Zone-wise -Anticipation of littering and capacity To empower residents to arrange squander, network receptacles are given at sensible separations relying upon neighborhood necessity.In Bilaspur there are 495 community bins and 140 open spaces where people throw there wastes. Table 4 gives zone wise solid waste collection arrangement in Bilaspur city.

Table 3: Zone wise solid waste collection arrangement in Bilaspur city.

Zone	Container	Square Bin	Round Bin	Open Spaces
Zone 1	23	37	8	19
Zone 2	11	32	12	22
Zone 3	16	23	16	27
Zone 4	11	22	12	13
Zone 5	14	31	23	9
Zone 6	19	35	19	16
Zone 7	22	33	22	11
Zone 8	15	28	11	23
Total	**131**	**241**	**123**	**140**

Source: Bilaspur Municipal Corporation. SWD

6. Collection System Efficiency of Municipal Solid Waste -Bilaspur city generates total solid waste to the tune of 230 MT/D of which 185 MT/D is collected. Out of this 18.400 MT/D is collected through door to door collection and 78.100 MT/D is collected from community bins. Waste collected through other sources and street sweeping, market waste, commercial establishments is 88.500MT/D.

Table 4: Comparison of total quantity of solid waste collection by door to door collection, bins and other sources

Zones	Total Solid Waste Generated (In MTD)	Door to Door collection (In MTD)	Waste from community bins (MTD)	Waste from other sources (sweeping, markets, commercial establishments etc)	Total Solid Waste collected (In MTD)
1	26.00	1.9	9.7	7.4	19.00
2	28.00	1.2	8.5	6.3	16.00
3	27.00	2.3	7.6	12.1	22.00
4	32.00	2.0	9.4	9.6	21.00
5	34.00	3.2	11.3	13.5	28.00
6	27.00	2.6	14.3	16.1	33.00
7	29.00	3.4	9.4	15.2	28.00
8	27.00	1.8	7.9	8.3	18.00
Total	**230.00**	**18.40**	**78.10**	**88.50**	**185.00**

Source: Bilaspur Municipal Corporation. SWD

7. Used Vehicles and transportation system - Generated waste is collected daily with the vehicles like truck, dumper placer, Compactor, tempo, etc(Table 5). The transportation adds to the city air pollution of planned properly. Most of these vehicles carry the waste in open manner creating nuisance of odour and smell. shows zone wise transportation arrangement for solid waste

Table 5: Zone wise transportation arrangement for solid waste in Bilaspur city

Zone	Truck	No. of trips /day	dumper placer	No. of trips /day	compactor	No. of trips /day	407 temp	No. of trips /day	Distance from the disposal site
zone 1	1	5	1	4	0	0	1	2	3 KM
zone 2	0	5	1	5	1	1	0	0	5 KM
zone 3	1	4	1	4	0	0	0	0	6 KM
zone 4	1	4	1	6	1	1	0	0	9KM
zone 5	1	6	1	7	1	2	0	0	12KM
zone 6	1	7	1	7	1	2	1	2	13KM
zone 7	2	4	1	6	1	1	0	0	11KM
zone 8	0	3	1	4	0	0	0	0	7 KM
Total	**7**	**38**	**8**	**43**	**5**	**7**	**2**	**4**	-

Source: Bilaspur Municipal Corporation. SWD

8. Waste Disposal Areas - The waste is disposed daily to the landfill site located on Mangla , Lalkhadan and Kachhar . The disposal is dumped in landfill and open giving rise to contamination and the treatment process of very small quantity of generated solid waste has been carried out in solid waste treatment plant situated at Village Kachhar for last two years.

IV DISCUSSION

A large portion of the waste dumped on open. The landfill destinations are not all around kept up, which make the danger of groundwater sullying due to lechate permeation. Open dumped trash fills in as reproducing ground for sickness vector, for example, flies, mosquitoes, cockroaches, and rodents influences different bugs. The waste now and then is taken by nearby ranchers as manure. The vast majority of the waste remains setting down in open causing contamination with the scent and smell except if corrupts normally. A treatment plant of anaerobic processing is also under construction progress to separate vitality from natural waste producing the biogas at kachhar.

Impacts of Waste Disposal on SWM workers -The information on health impacts was collected by personal interview conducted; data details are beyond the scope of this paper. The general effects are condensed in following lines. Workers/Laborers, who are related with the procedure strong waste administration at various level, are powerless to the extent wellbeing risks are worried because of steady and long time direct contact with strong waste. Laborers get medical issues like incidental wounds like individual cuts from scarp squander materials and they may likewise lead the harming from chemical wastes.[7,8] Now and then wounds brought about by contaminated sharp metal waste. Further eye and skin diseases because of presentation of contaminated residue are additionally announced in laborers.
Aside from these medical issues, laborers likewise face issues like asthma, T.B., and some respiratory sicknesses. Sweepers are experiencing spinal pain because of consistently clearing for an impressive separation for each day. Those laborers who are stacking trash into trucks are confronting eye issues and it was seen in field work that their eyes were red in shading. During waste stacking forms dust particles spread in the encompassing air and it makes issue of air contamination[9,10,11,12,13]. The effects of strong waste on the laborers can be limited by adhering to the rules and recommended rules.

Impacts on Rag pickers & Surrounding Populations - The Rag pickers are likewise experienced pathogenic sicknesses and they don't get any medicals offices for medical issues. These individuals have a place with most unfortunate classifications and they can't bear the cost of even two squares dinner in one day. The general public individuals are not acknowledged as companions of the general public who keeps their territory clean. In and surroundings zones of landfills locales and dumping places are experienced numerous issues.[14,15,16,17,18] Because of open dumping of strong waste, it emanates awful stench because of essence of dead creature squander and biodegradable segments. Rodents and pooches are benefiting from such dumping spot and they may nibble people groups present in those territories. Such dumping destinations are ruining condition of close by villages and towns encompassing the dumping site.

IV- CONCLUSION

- Bilaspur is one of the main urban areas in Chhattisgarh state. The management/ administration and transportation of solid waste are irrational and it makes majorgenuine natural problems.
- Sudden increase in city area and population due to expansion of municipal corporation area during last year causing major problems for collection and transportation of solid waste due to extra addition of population and generated solid wrests.
- Quantity of uncollected waste also increased due to area expansion. Solid waste collection method/system of Bilaspuralso requires lots of improvement with the involvement of skilled workers, modern equipments & public awareness.
- The disposal of solid waste is not erudite and it creates serious problems for environment. Currently started solid waste treatment plant at kachhar is also not working properly due to wrong site selection, limited resources and unskilled/semi-skilled workers.
- Leachate and high moist conditions expands the danger of medical issues. The joined impacts of uncollected worthless, poor handling and Insufficient disposal safeguards for municipal solid wastes have always implications for public health leading to the spread of epidemics, chances of transmission of diseases, the and loss of healthy urban and amenable environment.
- Environmental Impact Assessment of the nearby area (around 500m radius) of the open land fill/dumping yard need to carry out for checking ground water contamination, air pollution and other health hazard issues etc.

REFERENCES:

[1] Colon, M. and Fawcett, B., (NY), "Community-based Household Waste Management: Lessons Learnt from EXNORA"s „Zero Waste Management"Scheme in Two South Indian Cities", Habitat International, in press (ElsevierPublication).

[2] Yousuf Tarique Bin, Rahmein Mostafizur (2007), Monitoring quantity and characteristics of municipal solid waste in Dhaka city. Environ. Monit. Assessment, 135: pp3-11.

[3] Sheel Kumar, Sunil Kumar and Alpana Parmar (2005), Solid Waste Management: A contemporary issue for urban areas, Environment and Development: Challenges and Opportunities, I.K. International Pvt. Ltd. New Delhi, pp.509-585.

[4] Kama Vasisth (2011), Waste Management, Maxford books, New Delhi. pp.4-7.

[5] B.L.Chavan and N.S. Zambare "A Case Study on Municipal Solid Waste Management in Solapur City, Maharashtra, India" International Journal of Research in Civil Engineering, Architecture & Design Volume 1, Issue 2, October-December, 2013, pp. 46-53,

[6] Ahmad K. Sharholy M. Mahmood G. Trivedi R.C. (2008) ; Municipal solid waste management inIndian cities – A review Journal of Science Direct, Elsevier Waste Management 28 459-467.

[7] Kumar, S. and Gaikwad, S.A., (2004), "Municipal Solid Waste Management in Indian Urban Centres: An Approach for Betterment", Urban Development Debates in the New Millennium, Edited by K.R. Gupta, Atlantic Publishers & Distributors, New Delhi,pp.100-111.

[8] NEERI Report, (1996), "Strategy Paper on Solid Waste Management in India",pp.1-7.

[9] Narendranath Guria and Dr. Vijay Kumar Tiwari "Municipal Solid Waste management in Bilaspur City (C.G.) India National Geographer, Allahabad, UP. vol.XLV,No.1+2jan-june, july-dec.2010 ISSN -0470-092

[10] Shristi Sinha, and Mr. R K Bhatia "Challenges in municipal solid waste management in Indian cities: A casestudy of Bilaspur (Chhattisgarh)" International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 06 | June-2016

[11] ISWA (International Solid Waste Association) guidelines for waste to energy in low and middle-incomecountries

[12] SWMR, 2000; State of Vermont Agency of natural resources Department of environmental conservation, Solid Waste ManagementRules-2000.

[13] Asthana D.K., Asthana Meera (2003), Environmental problems and solutions, S. Chand and company Ltd. New Delhi. - 110 055. pp.1-8.

[14] GOI, National program on "Energy recovery from Urban, Municipal and Industrial Wastes byMNES.

[15] Solid Waste Management Rules 2015, Ministry of Environment, Forest and Climate Change, NewDelhi.

[16] Santra S.C. (2001), Environmental Science, New Central Book Agency, (P) Ltd. Kolkata- 700 009.

[17] Rao Venugopal P.(2006), Environmental Science And Engineering, Prentice – Hall of India Pvt. Ltd., New Delhi – 100001.

[18] Brockerhoff,M.andBrennam,E.(1998)"ThePovertyofCitiesinDevelopingRegions",Population and Development Review, Vol. 24, No. 1, pp. 75-114.