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# MUNICIPAL SOLID WASTE MANAGEMENT: A STUDY ON MUNICIPALITIES OF NORTH 24 PARGANAS, WEST BENGAL

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## ABSTRACT

Municipal solid waste (MSW) management in urban India is one of the major concerned issues now a day. Improper management in solid waste directly causes health hazards in urban population. Various observations and study have revealed that about 90% of the MSW is disposed to open areas, dumping ground irrespective of discriminating their physico- chemical characteristics. North 24 Parganas, the district in West Bengal, having the largest no of municipalities has been considered in this paper for study. An attempt has been made for a comparative study among the 27 municipalities of N 24 Parganas by using both primary and secondary data for statistical analysis to interpret the changing scenario of Municipal Solid Waste Management in the different municipalities for the last 5 years. An approach has been made to find out the relevance of this paper with recommendations for further study also.

**Key words:** solid waste management system, health hazards, physico- chemical parameters, generation and collection of solid waste

## Introduction

Each and every waste is to be considered as an asset. Solid waste management means to reuse the wealth which we term as “waste”. Increasing population, resulting to urban development, high standard of living etc have all together contributed to solid waste generation in India. Government of India in this regard recently have adopted a national level campaign named “Swatchh Bharat Abhiyan” that is covering 4041 statutory towns to clean the roads & streets and infrastructure of India. According to the reports of central pollution control board the metro cities of India all together generates about 0.573 MMT/day ie. 68.8 Million Metric Tonnes per year, including municipal solid waste, industrial solid waste and biomedical solid waste.

  

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**Table 1: State / UT wise status for MSW generated and processed up to November 2016**

| Sl. No. | State/ UT | Total waste generation (MTPA) | Total waste processed (%) |
|---|---|---|---|
| 1. | Andhra Pradesh | 23330160 | 29 |
| 2. | Andaman & Nicobar Island | 36500 | 52 |
| 3. | Arunachal Pradesh | 66065 | 20 |
| 4. | Assam | 413910 | 35 |
| 5. | Bihar | 828915 | 43 |
| 6. | Chandigarh UT | 172280 | 85 |
| 7. | Chhattisgarh | 601885 | 84 |
| 8. | Daman & Diu | 11680 | 65 |
| 9. | Dadra Nagar Haveli | 12775 | 0 |
| 10. | NCT of Delhi | 3832500 | 55 |
| 11. | Goa | 94900 | 65 |
| 12. | Gujarat | 3702925 | 57 |
| 13. | Haryana | 1647610 | 17 |
| 14. | Himachal Pradesh | 124830 | 40 |
| 15. | Jammu & Kashmir | 501510 | 8 |
| 16. | Jharkhand | 849335 | 42 |
| 17. | Karnataka | 3650000 | 32 |
| 18. | Kerala | 227760 | 60 |
| 19. | Madhya Pradesh | 2344760 | 65 |
| 20. | Maharashtra | 8238050 | 44 |
| 21. | Manipur | 64240 | 50 |
| 22. | Meghalaya | 97820 | 58 |
| 23. | Mizoram | 73365 | 4 |
| 24. | Nagaland | 124830 | 52 |
| 25. | Odisha | 992800 | 12 |
| 26. | Poduchery UT | 127750 | 10 |
| 27. | Punjab | 1496500 | 33 |

  

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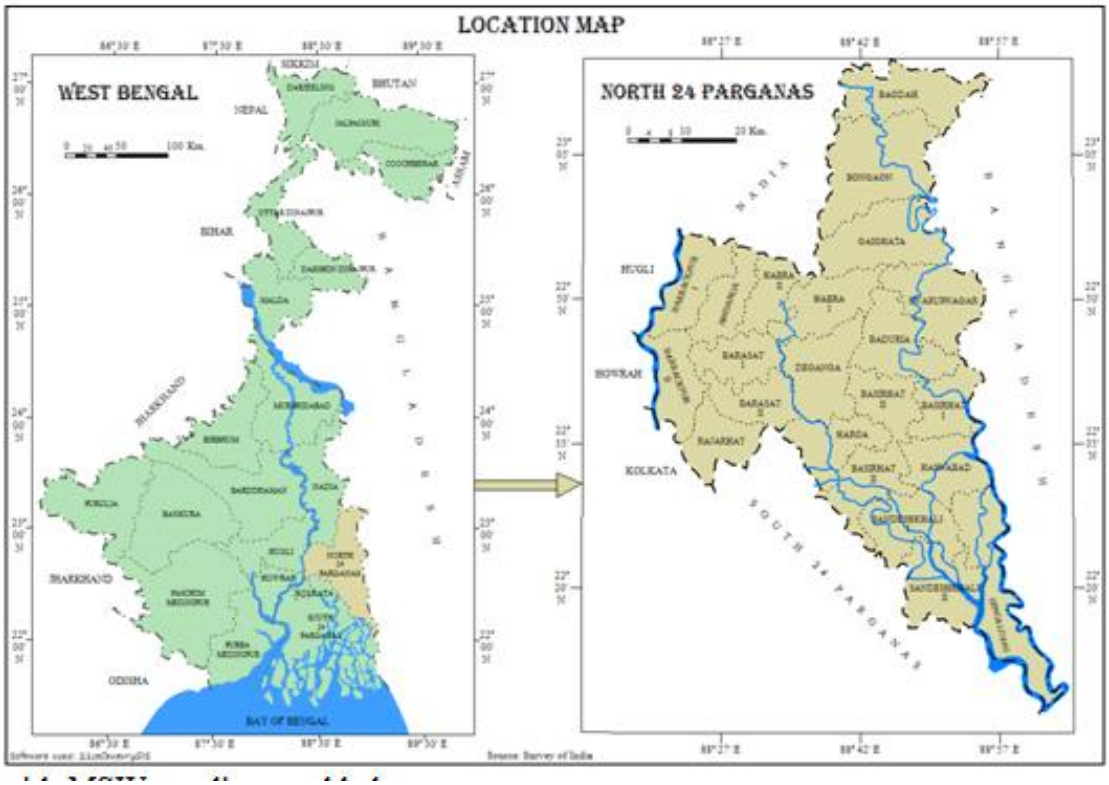
|---|---|---|---|
| 28. | Rajasthan | 2372500 | 55 |
| 29. | Sikkim | 32485 | 60 |
| 30. | Tamil Nadu | 5601655 | 55 |
| 31. | Telangana | 2690415 | 73 |
| 32. | Tripura | 153300 | 45 |
| 33. | Uttar Pradesh | 6132000 | 57 |
| 34. | Uttarakhand | 513190 | 38 |
| 35. | West Bengal | 2810500 | 5 |

Source: Annual Report (2015-16), Central Pollution Control Board

**Defining study area:**

North 24 Parganas, a district of southern part of West Bengal is having the highest number of municipalities (27), among which 20 municipalities are under Kolkata Metropolitan Area (KMA) and only 07 lies under non KMA part. Hypothetical deduction that can be stated that MSWM in the KMA part is quite better than the non KMA parts of north 24 Parganas., leading to major health problems in those areas.



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**Statement of the problem:**

Some problems associated with MSW are discussed below:

- MSW are not always segregated from the household level. The garbage bins provided by the municipalities are often misused by the local inhabitants.
- In 2011 a project for Vermi-compost were launched in several municipalities, particularly in those under KMA. But due to lack of demand the project failed.
- Some risks identified are disease transmission, particularly dengue outbreak were severe in SDDM, BM, BMC and in Habra municipality during 2014 to 2016.

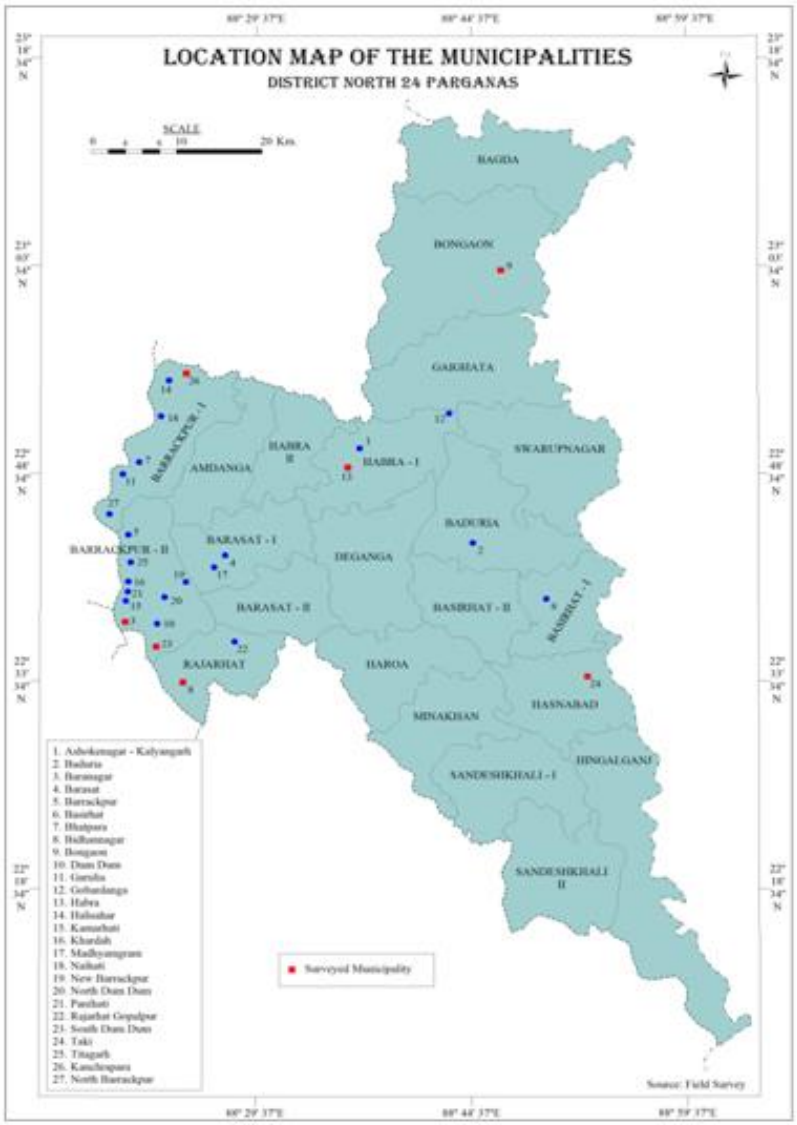


  

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**Table 2: Municipality details**

| Sl. No. | Name of the municipality | Category | Total population (2011 census) | No of wards | Area (square kilometre) | Minimum land requirement for processing and dumping (in Acre) |
|---|---|---|---|---|---|---|
| 1. | Ashoknagar- Kalyangarh | Non-KMA | 121592 | 22 | 20.64 | 7 |
| 2. | Baduriya | Non-KMA | 52493 | 17 | 22.43 | 4 |
| 3. | Baranagar | KMA | 245213 | 34 | 7.62 | 13 |
| 4. | Barasat | KMA | 278435 | 32 | 34.50 | 15 |
| 5. | Barrackpur | KMA | 152783 | 24 | 10.61 | 9 |
| 6. | Basirhat | Non-KMA | 125254 | 22 | 22.05 | 7 |
| 7. | Bhatpara | KMA | 383762 | 35 | 32.50 | 21 |
| 8. | Bidhannagar | KMA | 618358 | 60 | 60.00 | 33 |
| 9. | Bongaon | Non-KMA | 108864 | 22 | 14.27 | 6 |
| 10. | Dumdum | KMA | 114786 | 22 | 9.73 | 7 |
| 11. | Garuliya | KMA | 85336 | 20 | 6.48 | 5 |
| 12. | Gobardanga | Non-KMA | 45377 | 17 | 13.50 | 3 |
| 13. | Habra | Non-KMA | 147221 | 24 | 21.80 | 8 |
| 14. | Halisahar | KMA | 124939 | 23 | 8.29 | 7 |
| 15. | Kamarhati | KMA | 330211 | 35 | 10.96 | 18 |
| 16. | Kanchrapara | KMA | 120345 | 24 | 9.07 | 7 |
| 17. | Khardah | KMA | 108496 | 22 | 6.87 | 6 |
| 18. | Madhyamgram | KMA | 196127 | 25 | 21.56 | 11 |
| 19. | Naihati | KMA | 217900 | 31 | 11.81 | 12 |
| 20. | New Barrackpur | KMA | 76846 | 20 | 6.89 | 5 |
| 21. | North Barrackpur | KMA | 132806 | 23 | 12.22 | 7 |
| 22. | North Dumdum | KMA | 249142 | 31 | 26.45 | 14 |
| 23. | Panihati | KMA | 377347 | 35 | 19.38 | 20 |

  

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|---|---|---|---|---|---|---|
| 24. | Rajarhat- Gopalpur | KMA | 402844 | 35 | 28.00 | 20 |
| 25. | South Dumdum | KMA | 403316 | 35 | 17.96 | 22 |
| 26. | Taki | Non-KMA | 38263 | 16 | 12.97 | 3 |
| 27. | Titagarh | KMA | 116541 | 23 | 3.28 | 7 |

Source: State Policy and Strategy on SWM of West Bengal, 2015

**Objectives and methodology:**

Some main objectives of this study are as follows:

1. To assess the differential level of MSWM in the KMA and non KMA parts of north 24 Parganas.
2. To establish a correlation between the population density and solid waste generation.
3. To analyse the major physico- chemical components of the MSW.

A pilot survey was conducted in 7 municipalities of which 4 (Baranagar, Bidhannagar, South Damdam and Kanchrapara) are under the KMA part and rest 3 (Bongaon, Habra, Taki) are in non KMA part. Both primary and secondary data have been used for illustration supported with cartographic and statistical interpretation.

**Results and Discussion:**

A. Assessment of waste generation is very important in case of solid waste management. Composition and characteristics found the solid waste samples collected are mainly of 4 types:

1. Biodegradable waste: food, kitchen waste, green wastes like vegetables, flowers leaves fruits etc
2. Recyclable materials: paper, bottles, cans, metals, glass etc
3. Composite waste: clothing, tetra packs, waste plastics
4. Domestic hazardous waste: waste medicines, paints, fluorescent bulbs and tubes, some pesticides, shoe polishes, chemicals etc.

**Table 3: Analysis of the major properties of MSW samples collected from the surveyed area**

| Parameters | Samples materials | | |
|---|---|---|---|
| | Range value | Mean | Standard deviation |
| **Main Physical- chemical properties** | | | |
| Moisture (%) | 21.46-38.72 | 27.06 | 2.06 |
| pH ($H_2O$) | 6.34-6.78 | 6.66 | 0.26 |

  

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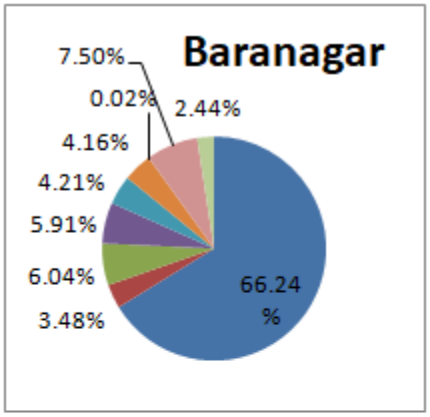
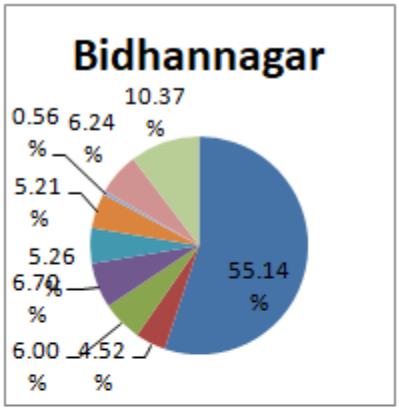
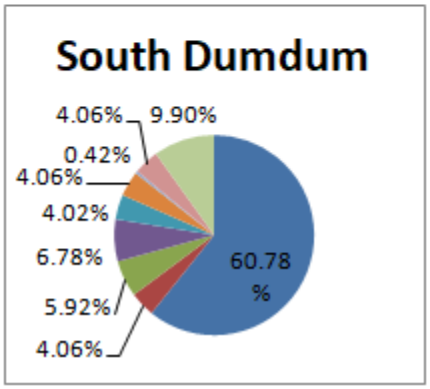
|---|---|---|---|
| Volatile solids (%) | 44.02-60.36 | 51.26 | 3.18 |
| Organic carbon (%) | 23.89-34.42 | 28.21 | 3.14 |
| Total N (%) | 0.76-1.03 | 0.90 | 0.12 |
| Ash content (%) | 36.73-56.48 | 48.83 | 3.24 |
| C:N | (27:1)-(35:1) | 30:1 | 0.52 |
| **Microbial parameters** | | | |
| Total bacterial count | (28-70)×$10^5$ | 57×$10^5$ | ±6.4×$10^6$ |
| Total fungal count | (13-52)×$10^4$ | 28×$10^4$ | ±3.1×$10^4$ |

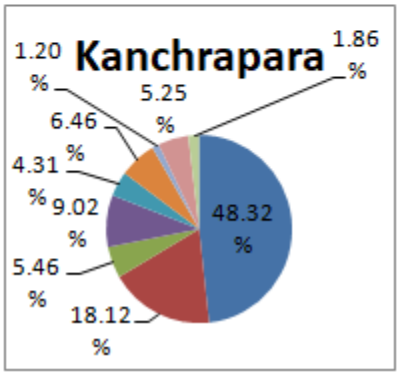
A graphical analysis has been done to compare the broad category of the samples of MSW collected from the surveyed municipalities which exhibits that organic garbage is the dominating component followed by ash content in maximum municipalities.Baranagar municipality (66.24%) is having the highest proportion of organic garbage followed by South Dumdum (60.78%). Ash content is highest in Kanchrapara (18.12%).

**COMPARATIVE STUDY OF MAJOR COMPONENTS OF MSW IN THE SURVEYED MUNICIPALITIES**



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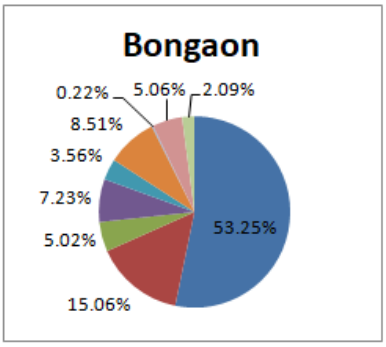


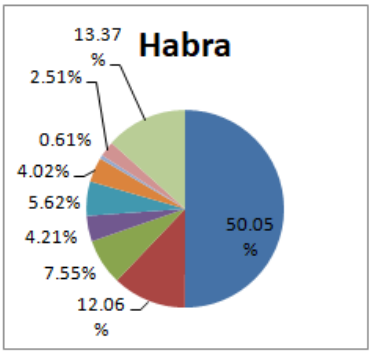


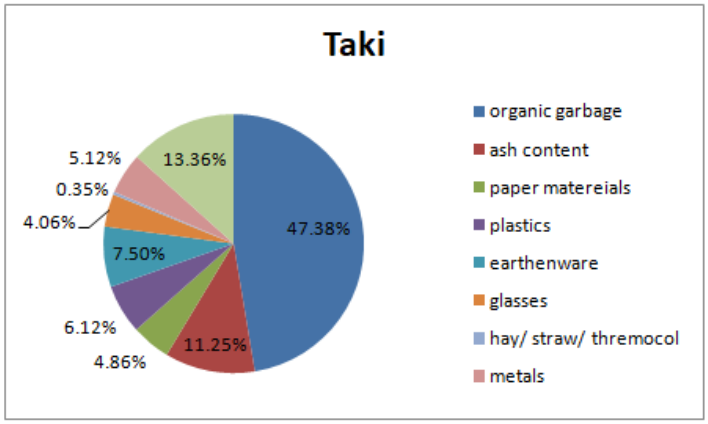


B. On the basis of secondary data some important aspects of MSWM found in the study area are, solid waste generation and collection commonly practised in the municipalities under KMA and non KMA are at differential in level. The per capita solid waste generation is also high in the KMA parts of North 24 Parganas.

**Table 4: MSW generation of the surveyed ones (2015-2016)**

| Sl. No. | Name of the municipalities | Total Population (2011) | Waste generation (MT/ day) | Waste collection (MT/ day) | Per capita waste generation (gm/day) |
|---|---|---|---|---|---|
| Municipalities under KMA | | | | | |
| 1. | Baranagar municipality (BM) | 254213 | 146 | 120 | 574.32 |
| 2. | Bidhannagar municipal corporation (BMC) | 618358 | 232 | 200 | 375.19 |
| 3. | Kanchrapara municipality | 120345 | 60 | 52 | 498.57 |
| 4. | South Damdam municipality | 403316 | 88 | 75 | 218.19 |
| Municipalities under Non- KMA | | | | | |
| 5. | Bongaon | 108864 | 52 | - | 477.66 |

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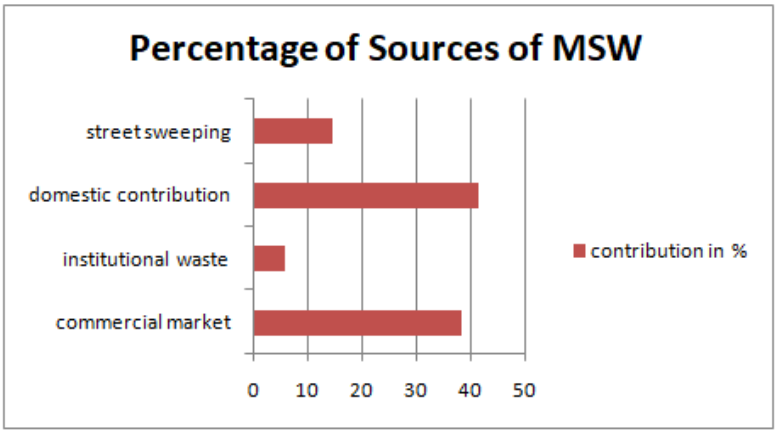
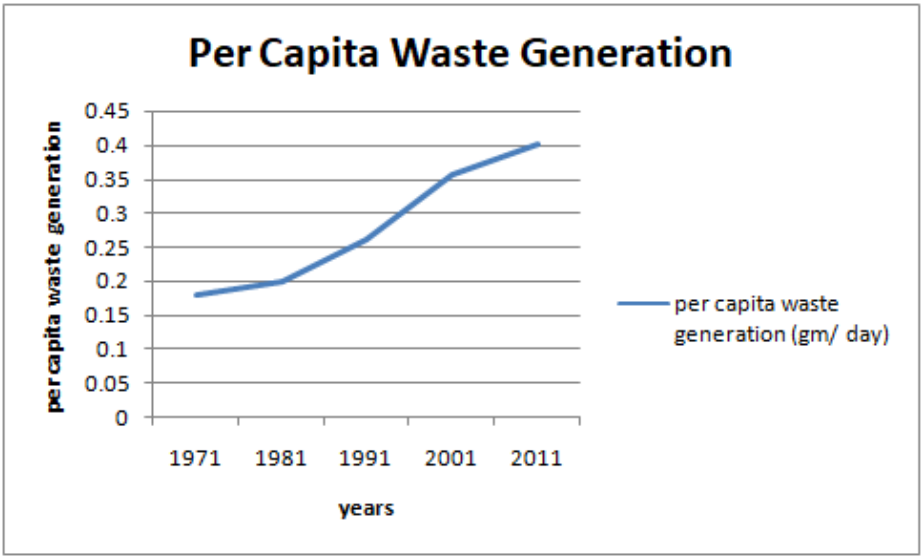
|---|---|---|---|---|---|
| 6. | Habra | 147221 | 38 | - | 258.12 |
| 7. | Taki | 38263 | 46 | 40 | 120.22 |

C. Waste generation rate from different sources:Major sources of MSW in the study area reveal that a max contribution of domestic hazardous waste (41.27%) followed by commercial market place (38.24%). This is an alarming situation that indicates the lack of awareness among the local people, in spite of so many campaigning programmes of state as well as central government.




D. Per capita waste generation trend: rapid population increase and globalisation have accelerated the MSW generation. The per capita waste generation in the municipalities of KMA is higher than the non KMA part of North 24 Parganas.



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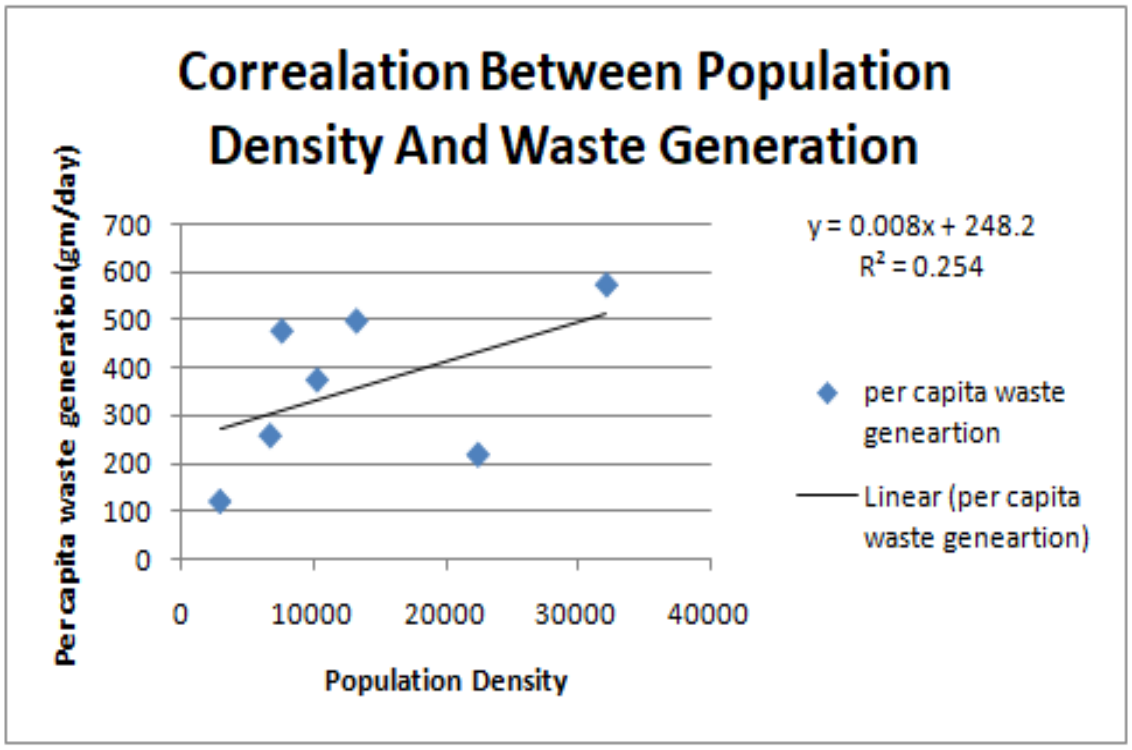
A positive correlation is found in the analysis of per capita waste generation and increasing population density which is an obvious result of urbanisation and globalisation. The municipalities under KMA are much prone towards huge waste generation in compare to the Non KMA belts.




**Conclusion**

The MSW generation in huge amount is a major issue still today though various methodical management steps were introduced in different municipalities. Not only the urban local bodies but also the different NGOs are working in this matter. The transportation and processing of the MSW is quite scientific now a day. Biodegradable wastes, e- waste, recyclables are separated and transported for treatment. Treatability for processing solid waste actually depends on its physico- chemical analysis. MSW collected from household and commercial markets contain a large quantity of inert materials and sizable amount of recyclable matter. This requires a proper segregation at the source. Composting and land filling can be carried out economically and efficiently in such case.

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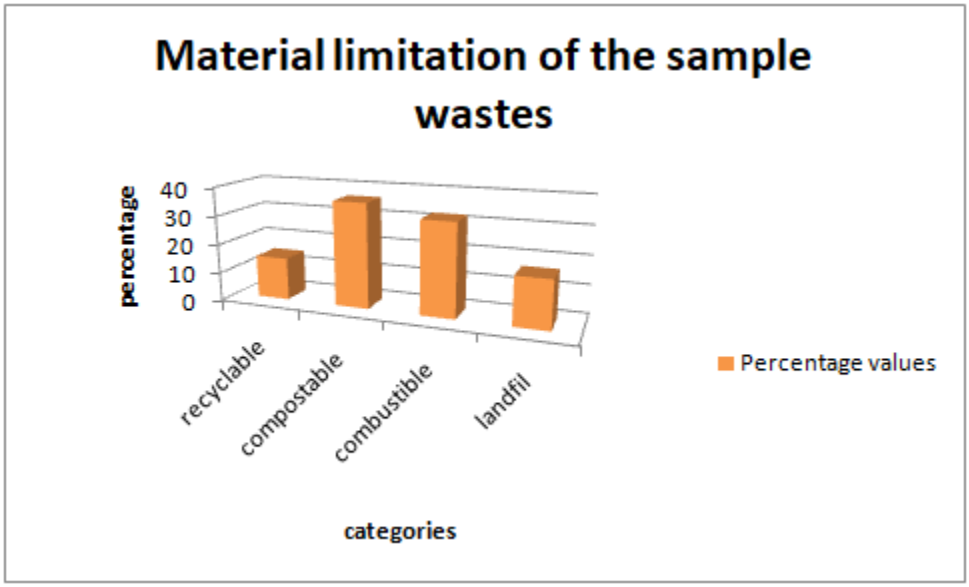


The scope for future study in this field can be encouraged through forecasting methods which can be calculated through a quantum analysis from 2011 to 2050. Private sectors have not been involved so far which is another limitation of better management. Various government projects are being launched to recover the problems associated with MSWM but the prime condition of implementation of these projects and their success rate depend on the awareness of the local inhabitants who are actually playing a dual role in MSW generation: contributors and sufferers.

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