

Report of Solid Waste Management
of
Tripura State



Data Collected, Compiled and Analyzed
by
TSPCB-ENVIS Centre
Tripura State Pollution Control Board

CHAPTER 1: INTRODUCTION

According to Indian Constitution article 48-A provides specific provisions on Environmental protection which tells that “the State shall endeavor to protect and improve the environment and to safeguard the forest and the wild life of the country”. Environmental protection is the fundamental duty of the every citizen of the country under Article 51-A (g). The 42nd amendment, 1974 of the constitution makes it the responsibility of the state government to protect and improve the environment, and safeguard forest, wildlife of the country.

Keeping an eye to protect the environment of the state, Tripura State Pollution Control Board was established under the Water (prevention and Control of Pollution) Act, 1974 and the Air (prevention and Control of Pollution) Act, 1981 by the government of Tripura in the year 1988 with an aim to combat the air and water pollution mainly for protection of environment of the state. Besides preventing air and water pollution TSPCB is also engaged itself in various additional activities which include Solid Waste Management, Bio Medical Waste Management, plastic Waste Management and Hazardous Waste Management etc. In this report the status of solid waste management for the year 2016 has been tried to figure out and also tried to find the trend of Solid Waste generation in the state.

1.1 Implementation of Municipal Solid Waste (Management & Handling) Rules, 2016

- (a) Monitoring the consent of the standards regarding ground water, ambient water, leachate quality including incineration as specified under Schedule II, III and IV of MSW
- (b) Issuance of authorization to the municipal authorities or the operator of a facility for setting up waste processing and disposal facility including landfills
- (c) Preparation of annual report with regard to implementation of the rules

(d) Monitoring the performance of waste processing and disposal facility. This activity will include:

(i) Inventorization of waste processing facilities.

(ii) Inventorisation of landfill operation in cities and towns.

(iii) Monitoring of ground water in and around landfill sites.

(iv) Ambient air quality monitoring at landfill sites as per the frequency suggested in the rule & guidelines.

(v) Monitoring standards prescribed for composting, incineration or other processing facility set up by the local authority.

(e) Organizing interaction meetings with local authorities for creating awareness and assisting them for preparation of action plan for implementation of rule.

(f) Take assistance of local technical/ financial institutions including NGOs/ Resident Welfare Association and involving local bodies to develop/ formulate schemes and programme for implementation rules.

1.2 Implementation of Bio Medical Waste (Management & Handling) Rules, 1998

(a) Inventorization of sources generating Bio Medical Waste.

(b) Issuance of notice to all sources generating Bio Medical Waste and also to issue authorization to all institution generating Bio Medical Waste.

(c) Organizing interaction meetings with all concerned institutions/ stakeholders for relating awareness and also for discussing the issue of implementation on Bio Medical Waste (Management & Handling) Rules, 1998.

(d) Preparation of action plan in compliance with schedule VI of the rule.

(e) Preparation of annual status report with regard on management of Bio Medical Waste.

1.3 Implementation of Recycled Plastic Manufacture and Usage Rules, 1999

(a) TSPCB to act as prescribed authority for implementation of the provisions of Recycled Plastic Manufacture and Usage Rules, 1999

(b) Inventorization of Industrial units manufacturing carry bags and containers made of plastic

- (c) Preparation of status report on management of plastic waste. State may examine on regulation of ban on Plastic bag usage and other related matters
- (d) Undertaking studies on proper disposal of plastic materials which could not be recycled
- (e) Monitoring of recycling of plastics in accordance with BIS specification IS14534, 1998 entitled “The Guideline for Recycling of Plastics.”

1.4 Implementation of Batteries (Management & Handling) Rules, 2016

- (a) TSPCB to ensure compliance with the Rules and also undertake inventory of manufacturer, importer, re-conditioner, assembler, dealer, recycler, actioner etc.
- (b) TSPCB to submit annual compliance status report to the CPCB before the end of the calendar year.
- (c) Preparing status/assessment on impacts of recycling on environment and other associated issues.

1.5 Implementation of Hazardous Waste Rules

- (a) To create data base on hazardous waste generating industrial units in Tripura
- (b) To identify and classify industries based on type and category of hazardous waste generation
- (c) To estimate the unit wise quantum of hazardous waste generation

CHAPTER 2: MUNICIPAL SOLID WASTE MANAGEMENT

2.1 Status of Solid waste management of the state in the year 2015-2016

- 1) Total number of towns/cities in the state: 20 nos.
- 2) Total number of ULBs: 14 Municipal Councils, 5 Nagar Panchayat and 1 Municipal Corporation
- 3) Total Municipal Solid waste (MSW) generated: 414.8 MTPD
- 4) Total Municipal Solid waste (MSW) collected: 368.2 MTPD
- 5) Total Municipal Solid waste (MSW) treated: 250.40 MTPD (one treatment plant is running under Agartala Municipal Corporation (250 MTPD) and one treatment is running under Khowai Municipal Council (0.40 MTPD))
- 6) In case of Solid waste collection a good practices of House-to-house collection is already done in 10 wards of Udaipur Municipal Council, in 15 wards of Kailasahar Municipal Council and 17 wards of Agartala Municipal Corporation.
- 7) Total solid waste storage in this state: 414.8 MTPD
- 8) Total Municipal Solid waste land filled: 164.40 MTPD

2.1.1 Solid waste Transportation

Transportation of solid waste to their specified dumping yard and sanitary landfill systems is carried out by Tipper, Truck, Hand Cart, Van, Tri-cycle, Auto Van, Rickshaw, Jeep, Tractor, Cremation Van etc.

2.1.2 Solid waste processing

Table 2.1: Solid waste processing facilities setup:

| Sl. No. | Composting | Vermin-composting | Biogas | RDF / Pelletization |
|----------------|-------------------|--------------------------|---------------|----------------------------|
| 1. | 250 MTPD | 0.40 MTPD | Nil | Nil |

Table 2.2 Processing facility operational

| Sl. No. | Composting | Vermin-composting | Biogas | RDF / Pelletization |
|----------------|-------------------|--------------------------|---------------|----------------------------|
| 1. | 250 MTPD | 0.40 MTPD | Nil | Nil |

Table 2.3 Processing facility under installation/planned:

| Sl. No. | Composting | Vermin-composting | Biogas | RDF / Pelletization |
|--|-------------------|--------------------------|---------------|----------------------------|
| Installation of processing facility composting/ Vermin-composting unit/ plants are going on in Udaipur, Kamalpur and Kailashahar | | | | |

2.1.3 Solid waste disposal

(i) Landfill sites identified:

17 (Seventeen) ULBs have identified their respective landfill Sites for disposal of MSW. 3 (three) ULBs namely Panisagar NP, Jirania NP & Mohanpur MC have not identified their respective Landfill sites for disposal of MSW.

(ii) Landfill constructed:

Except Agartala Municipal Corporation, other ULBs are not constructed any Landfill

(iii) Landfill under Construction:

Landfill under construction in Agartala Municipal Corporation

(iv) Landfill in operation:

One in Agartala Municipal Corporation

(v) Landfill exhausted:

No such Landfill is exhausted

(vi) Landfill capped:

No such Landfill is capped

(vii) Solid waste dumpsites

There are total 17 Nos of dumpsites are existing in Tripura and no dumpsites are converted to sanitary landfill.

Table 2.4 Monitoring at Waste processing/Landfill sites

| Name Of Facilities | Ambient Air | Ground Water | Leachate Quality | Compost Quality | Vocs |
|--------------------|-------------|----------------------------------|------------------|-----------------|----------|
| Not Done | Not Done | Done in Khowai Municipal Council | Done in Agartala | Not Done | Not Done |

2.2 Status of Solid Waste generation, storage and collection of the state

There are 20 (twenty) no. of Urban Local Bodies (ULBs) in the state Tripura which includes 1 (one) Municipal Corporation, 14 (fourteen) Municipal Councils and 5 (five) Nagar Panchayats. All of these ULBs are generating huge quantities of Solid Waste per day. The annual survey reports from all of these ULBs are telling that a figure of 414.8 MT solid waste is generating per day in this state. Detail of Municipal Solid Waste generation, storage and collection of different ULBs for the year 2015-2016 is summarized in the table 2.5.

Table 2.5: Solid Waste generation, storage and collection of different ULBs in the state (for the year 2015-2016)

| District | Type of ULBs | City/ Town Name | Generation in MTPD | Storage in MTPD | Collection in MTPD |
|------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|
| West Tripura | Municipal Corporation | Agartala | 250 | 250 | 250 |
| | Municipal Council | Mohanpur | 3 | 3 | 2 |
| | Municipal Council | Ranirbazar | 15 | 15 | 15 |
| | Nagar Panchayat | Jirania | 1 | 1 | 1 |
| South Tripura | Municipal Council | Santirbazar | 3.60 | 3.60 | 2 |
| | Municipal Council | Belonia | 25 | 25 | 20 |

| | | | | | |
|----------------------|-------------------|-------------|--------------|--------------|--------------|
| | Nagar Panchayat | Sabroom | 2.5 | 2.5 | 2 |
| North Tripura | Municipal Council | Dharmanagar | 16.50 | 16.50 | 10 |
| | Nagar Panchayat | Panisagar | 2 | 2 | 2 |
| Unakoti | Municipal Council | Kailashahar | 6.5 | 6.5 | 3 |
| | Municipal Council | Kumarghat | 7.2 | 7.2 | 7.2 |
| Gomati | Municipal Council | Udaipur | 16 | 16 | 13 |
| | Nagar Panchayat | Amarpur | 4.50 | 4.50 | 3 |
| Khowai | Municipal Council | Khowai | 20 | 20 | 15 |
| | Municipal Council | Teliamura | 7 | 7 | 6 |
| Sipahijala | Municipal Council | Bishalgarh | 7 | 7 | 3 |
| | Municipal Council | Melagarh | 1 | 1 | 1 |
| | Nagar Panchayat | Sonamura | 5 | 5 | 5 |
| Dhalai | Municipal Council | Ambassa | 10 | 10 | 7 |
| | Municipal Council | Kamalpur | 12 | 12 | 8 |
| Subtotal | | | 414.8 | 414.8 | 375.2 |

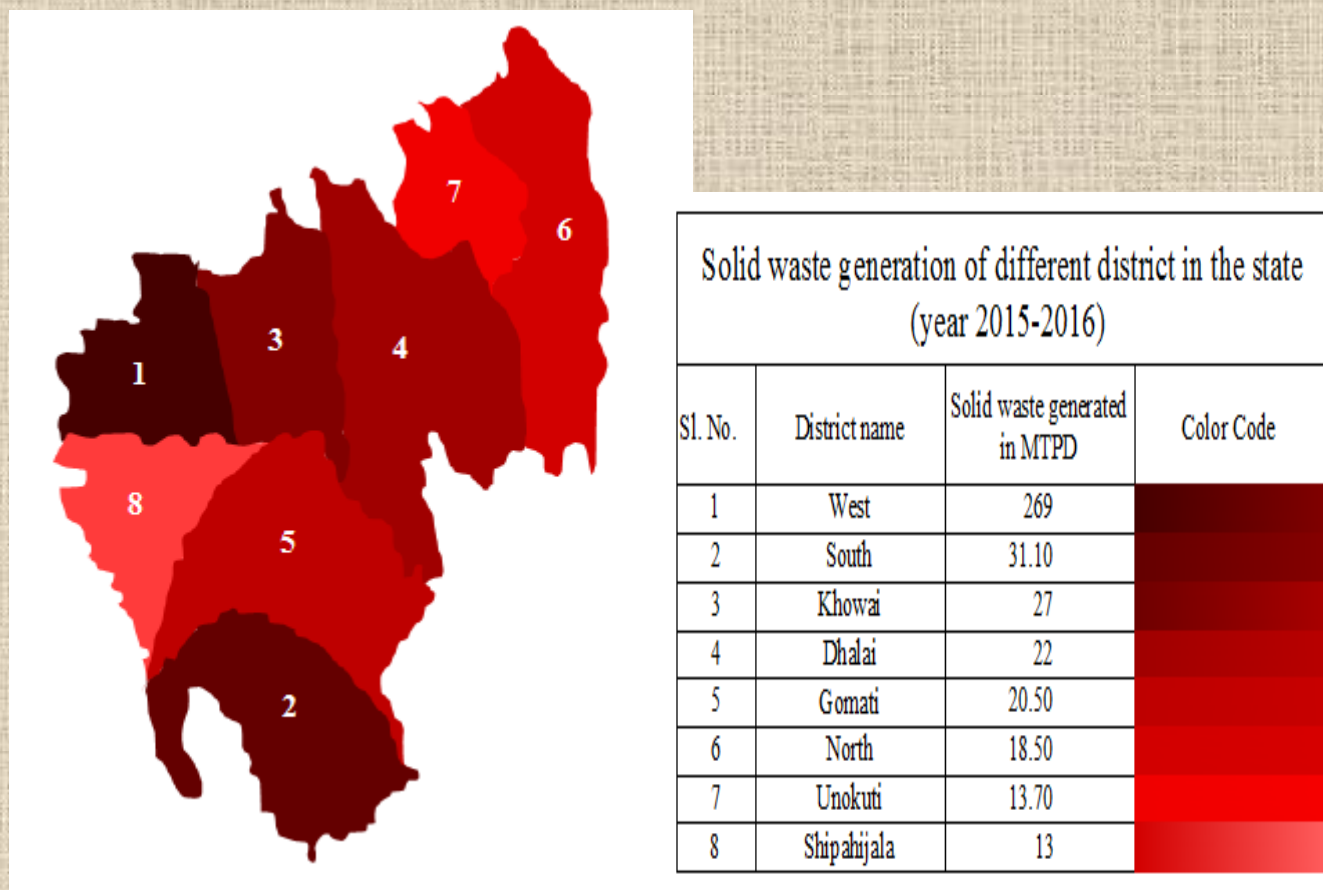


Fig 2.1: Map showing district wise solid waste generation in Tripura

2.3 Status of MSW Implementation scheme from collection to final disposal

Table 2.6: Status of implementations of MSW Rules from collection to the final disposal

| Name of the ULB | Collection system | Storage of MSW | Transportation of MSW | Disposal |
|-------------------------------------|---|--|---|---|
| Ranirbazar Municipal Council | House to House collection is not yet done but it will be started soon. Collection done from community bins. People used to throw household wastes in the community bins | Done. RCC Bin-10 Nos Trolley-2 Nos. Container-35 Nos. | Done. From community Bin to Laximipur disposal site using Tipper truck (1 No.) & Truck (1 No.) | Although Simply dumping is carried out but, some landfill sites are already identified at Laxmipur Mouja. |
| Teliamura Municipal Council | House to house collection is not being practiced. Collected wastes are being transferred to the community bins. | Done | Done From community bin to sat mile area using tripper tuck/ try cycle | Besides Simply dumping, Some new landfill sites are identified at Sat Miles near Khasia Mangal |
| Khowai Municipal Council | House to house collection is not being practiced. Collected wastes are being collected from the community bins. | Done [RCC Bin-10, Trolley-10] | Done From community Bin to Singichara Landfill Site using tripper truck (1 No.), Tri-cycle (6 Nos.), Mini truck (1 Nos.), Dumper Placer (2 Nos.) | Simply dumping is carried out. |
| Ambassa Municipal Council | House to house collection is not being practiced. People used to throw household wastes in the community bins. | Done [Container-85 Nos.] | Done From community Bin to S.G. Para and Basudev Para using Tipper Truck (1 No.), Tri-cycle. | Simply dumping is carried out. |
| Kamalpur Nagar Panchayat | House to house collection is not being practiced. People used to | Done [Container-90 Nos. each has 240 litre | Done From community Bin to land fill sites (Near Old Motor Stand) | Simply dumping is carried out. |

| | | | | |
|--------------------------------------|--|--|---|--------------------------------|
| | throw household wastes in the community bins.. | capacity] | using Tipper Truck (1 No.) | |
| Kumarghat Nagar Panchayat | Door to door (DtoD) collection of solid waste is being done. Ward No. 1 to 13 has been covered in DtoD collection system. | Done Masonry bins 25 Nos. Upto 1.1 m3 bins 179 Nos. 2-5 m3 bins 71 Nos. | Done. For collection and dumping purpose motorized vehicles (20%), Containerized tricycle/handcart (60%) and other device (20%) are used. | Simply dumping is carried out. |
| Dharmanagar Municipal Council | House to house collection is done from few houses. Rest of the people used to throw household wastes in the community bins. | Done [RCC Bin-1] | Done. From community Bin to land fill sites using Tipper Truck (1 No.), Truck (4 Nos.), Tractor Tailor (1 No.), Tri-cycle (4 Nos.) | Simply dumping is carried out. |
| Kailashahar Municipal Council | House to house collection is being practiced in 2500 houses. Rests of the household wastes are collected through community bins. | Done. | Done. From community bin to land fill sites using Tipper Truck (1 No), Tri-cycle (7 Nos.), Tractor Tailor (1 No.), Auto Van (3 Nos.) | Simply dumping is carried out. |
| Bishalgarh Municipal Council | House to house collection is not being practiced. People used to throw household wastes in the community bins | Done | Done From community Bin to land fill sites using Tipper Truck (1 No.) | Simply dumping is carried out |
| Sonamura Nagar Panchayat | House to house collection is not being practiced. People used to throw household wastes in the community bins | Done [RCC Bin-50] | Done From community Bin to land fill sites using tripper truck (1 No.), Dumper Placer (1 No.), Refuse collector (1 Nos.), Compactor (1 Nos.) & tri cycle (10 Nos.) | Simply dumping is carried out. |
| Udaipur Municipal | House to house collection is being | Done [RCC Bin-3, | Done From community bin | Simply dumping is |

| | | | | |
|------------------------------------|---|--|---|--|
| Council | practiced in 10 wards out of 19 wards. House to house collection is done by NGO upto the Community Bin. | container-4, M.S. Sheeted Dust Bin-7] | to Hirapur low land area using Tipper Truck (3 Nos.) & Truck (1 No.) | carried out. |
| Amarpur Nagar Panchayat | House to house collection is not being practiced. People used to throw household wastes in the community bins | Done [RCC Bin-16, Trolley-48] | Done. From community Bin to land fill sites/ surrounding low land area using Tipper Truck (1 No.) & Tricycle (5 Nos.) | Simply dumping is carried out. |
| Santirbazar Nagar Panchayat | House to house collection is done. People used to throw household wastes in the community bins | Done | Done From community Bin to landfill sites (Madhya Kathaliya GP & Munda Para) using Tipper Truck (1 No.), Truck (1 No.), Tri cycle | Simply dumping is carried out. |
| Belonia Municipal Council | House to house collection is not started. People used to throw household wastes in the community bins | Done [Container-37, Trolley-3, RCC Bin-54, Dumper placer-1, GCI Sheet Bin-8] | Done. From community Bin to land fill sites using Tipper Truck (1 No.), Tractor tailor (1), Tri cycle (14 Nos.), others (3 Nos.) | Simply dumping is carried out. |
| Sabroom Nagar Panchayat | House to house collection is not being practiced. People used to throw household wastes in the community bins | Done [RCC Bin-10 Nos.] | Done. From community bin to landfill sites using Tipper Truck (1 No.), Tractor Tailor (1 No.) | Simply dumping is carried out. |
| Panisagar Nagar Panchayat | House to house collection is not being practiced. | Done | Done From street/ market to temporary disposal sites using Tipper Truck (1 No.) | Simply dumping is carried out. |
| Jirania Nagar Panchayat | House to house collection will be started soon. | Done Up to 1.1 m3 bins 30 Nos. | Done From street/ market to temporary disposal sites using Tipping Truck (1 No.) & | For disposing 1 Nos. dumping site is situated at AMC |

| | | | | |
|--|--|--|--------------------|-----------------|
| | | | compactors (1 No.) | dumping Ground. |
|--|--|--|--------------------|-----------------|

Table 2.7: Year wise MSW generation from 2009-10 to 2015-16

| Sl. No. | Name Of Urban Local Body | Quantities of MSW generation in MTPD | | | | | |
|---------|--------------------------------|--------------------------------------|--------------|--------------|--------------|--------------|--------------|
| | | Year 2009-10 | Year 2010-11 | Year 2011-12 | Year 2012-13 | Year 2014-15 | Year 2015-16 |
| 1 | Agartala Municipal Corporation | 180 | 180 | 180 | 250 | 250 | 250 |
| 2 | Amarpur Nagar Panchayat | 2.5 | 3 | 3.5 | 4 | 4.50 | 4.50 |
| 3 | Ambassa Municipal Council | 0.5 | 0.5 | 0.5 | 0.5 | 10 | 10 |
| 4 | Belonia Municipal Council | 12 | 14 | 15 | 16 | 25 | 25 |
| 5 | Bishalgarh Municipal Council | 1.5 | 1.5 | 1.5 | 2 | 7 | 7 |
| 6 | Dharmanagar Municipal Council | 15 | 15 | 15 | 15 | 16.50 | 16.50 |
| 7 | Jirania Nagar Panchayat | NA | NA | NA | NA | 1 | 1 |
| 8 | Kailashahar Municipal Council | 5 | 5 | 5 | 5 | 6.5 | 6.5 |
| 9 | Kumarghat Nagar Panchayat | 5.5 | 5.5 | 5.5 | 6 | 7.2 | 7.2 |
| 10 | Kamalpur Nagar Panchayat | NA | NA | NA | 10 | 12 | 12 |
| 11 | Khowai Municipal Council | 10 | 14 | 14 | 15 | 20 | 20 |
| 12 | Melaghar Municipal Council | NA | NA | NA | NA | 1 | 1 |

| | | | | | | | |
|----|------------------------------|-----|-----|-----|------|------|------|
| 13 | Mohanpur Municipal Council | NA | NA | NA | NA | 3 | 3 |
| 14 | Panisagar Nagar Panchayat | NA | NA | NA | NA | 2 | 2 |
| 15 | Ranirbazar Municipal Council | 1.5 | 1.5 | 1.5 | 1.5 | 15 | 15 |
| 16 | Sabroom Nagar Panchayat | 2 | 2 | 2 | 2.1 | 2.5 | 2.5 |
| 17 | Santirbazar Nagar Panchayat | 2 | 2 | 2 | 4.05 | 3.60 | 3.60 |
| 18 | Sonamura Nagar Panchayat | 8 | 10 | 10 | 10 | 5 | 5 |
| 19 | Teliamura Municipal Council | 6 | 6 | 7 | 7 | 7 | 7 |
| 20 | Udaipur Municipal Council | 16 | 16 | 16 | 16 | 16 | 16 |

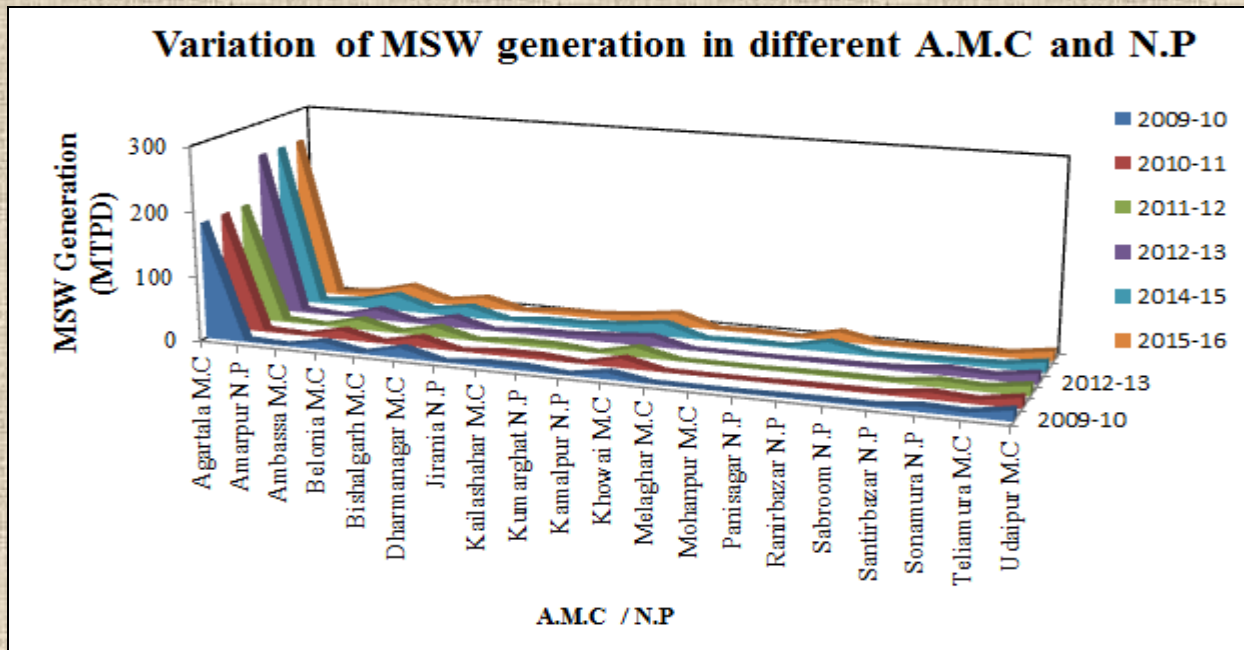


Fig 2.2: Year wise variation of MSW generation in different A.M.C and N.P in the state.

Fig. 2.2 indicates the yearly variation of MSW generation during the period (2009-10 to 2015-16) in our Tripura state. From the above Fig. 2.2 we can conclude that the solid waste generation in all of the municipality and Nagar Panchayat is almost same during the period 2009-10, 2010-11, 2011-12 and is followed by an increasing trend in each of the Municipality and Nagar Panchayat. The maximum solid waste generation was estimated at Agartala Municipal Corporation (180 MTPD; that time it was familiar as Agartala Municipal Council) and minimum quantity of solid waste (0.5 MTPD) was found in Ambassa Municipal Council. But, day by day with the gradual increase of population and rapidly spreading up of urbanization, solid waste production is going high. From the fig it can be clearly identified that after up gradation of Nagar Panhayat and Municipal Council quantity of solid waste generation is also be upgraded. During the period 2012-13, 2014-15, 2015-16 the maximum quantity of solid waste generated in Agartala Municipal Corporation was 250 MTPD which is indicating an increasing trend and the minimum solid waste was estimated at Melaghar Municipal Council.

CHAPTER 3: BIO MEDICAL WASTE MANAGEMENT

An inspection of Health Care Establishments was conducted to collect the base line data related to bio-medical waste generation, segregation based on their criteria, storage to the specified color coded bucket, treatment & disposal. The data regarding practice of waste segregation, the type of storage in the respective color coding containers, collection procedures, treatment and disposal of biomedical wastes were given importance. The list of hospitals, Medical Colleges, Government Hospitals and Nursing Homes of Tripura are presented at **Table 3.1** displayed below

Table 3.1: List of Medical Colleges, Government Hospitals and Nursing Homes

| Sl. No. | Details of Health Care Facilities | Bed Capacity | BMW Generation |
|---------|--|--------------|----------------|
| | State Hospital | | |
| 1 | Igm Hospital, Agartala | 510 beds | 168 kg/day |
| 2 | Cancer Hospital, Agartala | 50 beds | 15 kg/day |
| | District Hospital | | |
| 3 | Gomati District Hospital | 150 beds | 45 kg/day |
| 4 | Rajiv Gandhi Memorial District Hospital, Kailashahar | 125 beds | 37.5 kg/day |
| 5 | Khowai District Hospital | 100 beds | 30 kg/day |
| 6 | South Tripura District Hospital | 100 beds | 30 kg/day |
| | Sub Divisional Hospital | | |
| 7 | Belonia Sub-Divisional Hospital | 75 beds | 22.5 kg/day |
| 8 | Dharmanagar Sub-Divisional Hospital | 75 beds | 22.5 kg/day |
| 9 | Kanchanpur Sub-Divisional Hospital | 50 beds | 15 kg/day |
| 10 | LTV Sub-Divisional Hospital | 50 beds | 15 kg/day |
| 11 | B.S.M. Sub-Divisional Hospital, Kamalpur | 75 beds | 22.5kg/day |
| 12 | Gandacherra Sub-Divisional Hospital | 50 beds | 15kg/day |
| 13 | Tripura Sundari Sub-Divisional Hospital, South Tripura | 150 beds | 45 kg/day |
| 14 | Sabroom S.D. Hospital | 50 beds | 15 kg/day |
| 15 | Amarpur Sub-Divisional Hospital | 50 beds | 15 kg/day |
| 16 | Melaghar Sub-Divisional Hospital | 55 beds | 16.5 kg/day |

| | | | |
|----|--|----------|--------------|
| 17 | Bishalgarh Sub-Divisional Hospital | 55 beds | 16.5 kg/day |
| | Medical College | | |
| 18 | Agartala Govt. Medical College (AGMC) | 500 beds | 150 kg/day |
| 19 | Tripura Medical College And BRAM Hospital | 500 beds | 150 kg/day |
| | Other Hospitals | | |
| 20 | Christian Leprosy & General Hospital | 12 beds | 3.60 kg/day |
| 21 | ILS Hospital (Private Hospital) | 181 beds | 54.3 kg/day |
| 22 | BSF Composite Hospital | 50 beds | 15 kg/day |
| 23 | Military Composite Hospital | 10 beds | 3 kg/day |
| 24 | Primary Health Centre (79) | 502 beds | 150.6 kg/day |
| 25 | Community Health Centre (11) | 330 beds | 99 kg/day |
| | Nursing Home | | |
| 26 | Sanjeevani Nursing Home & Research Centre | 11 beds | 3.3 kg/day |
| 27 | The Care & Cure Polyclinic & Medical Research | 16 beds | 4.8 kg/day |
| 28 | Bhaumik Polyclinic & Nursing Home | 06 beds | 0.18 kg/day |
| 29 | Life Line Nursing Home & Research Centre | 18 beds | 5.40 kg/day |
| 30 | Sarkar Clinic & Nursing Home | 10 beds | 3 kg/day |
| 31 | Agartala Hospital & Research Centre Pvt. Ltd. | 23 beds | 6.90 kg/day |
| 32 | Asha Child Care & Nursing Home And Research Centre | 19 beds | 4.95 kg/day |
| 33 | Tropical Orthopadices & Related Research Centre | 06 beds | 1.80 kg/day |
| 34 | VHAT Eye Hospital | 30 beds | 9 kg/day |
| 35 | Dr. B. Majumder Memorial Nursing Home | 08 beds | 2.40 kg/day |
| 36 | P.C. Chatterjee Memorial Eye Hospital | 10 beds | 3 kg/day |
| 37 | Mahanam Seva Sadan | 10 beds | 3 kg/day |
| 38 | Devlok | 25beds | 7.50 kg/day |
| 39 | Ortho Care & Related Centre | 10 beds | 3 kg/day |

Apart from the medical colleges, Government Hospitals and nursing Homes, there are also many blood banks; hospitals, pathology etc. are contributing considerable quantities of biomedical wastes. The quantities of BMW generation are shown in **Table 3.2** below:

Table 3.2: List of pathological laboratories diagnostic centres, x ray clinic etc.

| Sl / No | Particular of Health Care Facilities | No of HCFs | Quantities of generation |
|---------|---|------------|--------------------------|
| 1 | Blood Bank | 80 | Nil |
| 2 | Blood Storage Centre | 07 | Nil |
| 3 | Ware house | 03 | Nil |
| 4 | Veterinary Hospital | 15 | 4.5 Kg |
| 5 | Incinerator site | 02 | Nil |
| 6 | Psychiatric Hospital | 01 | Nil |
| 7 | Pathological Laboratory, x ray Unit & Diagnostic centre | 531 | 159.3 Kg |

3.1. Quantification of Biomedical Waste:

The year wise assessment of Bio Medical waste indicates that the quantity of biomedical waste generation of Tripura state was 478 kg/day in the year 2005. The same quantity was maintained in the year 2006, 2007, 2008 also. But, in the year 2009, a slight increase (1.57% w.r.t 2005) of biomedical waste generation is observed. The total quantity of biomedical waste was estimated as 553 kg/day in the year 2009. Assessment of Bio Medical waste generation for the last 10 years i.e. year 2005 to 2015 is listed in **Table 3.3** and graphically represented by **Fig. 3.1** below.

Table 3.3: Year wise annual assessment of biomedical waste (kg/day)

| Sl. No. | Year | No. of HCF | Obtained authorization | Quantity Kg/day | treated |
|---------|------|------------|------------------------|-----------------|---------|
| 1 | 2005 | 833 | 212 | 478 | NA |
| 2 | 2006 | 916 | 301 | 478 | NA |
| 3 | 2007 | 928 | 316 | 478 | NA |
| 4 | 2008 | 955 | 343 | 478 | NA |
| 5 | 2009 | 972 | 359 | 553 | NA |
| 6 | 2010 | 1055 | 359 | 553 | NA |
| 7 | 2011 | 1120 | 423 | 1230 | 1048 |
| 8 | 2012 | 1157 | 463 | 1251 | 1068.03 |
| 9 | 2013 | 1223 | 529 | 1270.5 | 1083.39 |
| 10 | 2014 | 1258 | 564 | 1336.5 | 1129.6 |
| 11 | 2015 | 1298 | 605 | 1378.5 | 1176.1 |

There was a sudden rise in the quantities of bio medical waste generation from the year 2010 and onwards. Establishing of two medical colleges and up-gradation of few district hospitals are contributing a major portion of Bio Medical waste generation during the period 2010-2016. From the graph we can find an increasing trend in BMW generation.

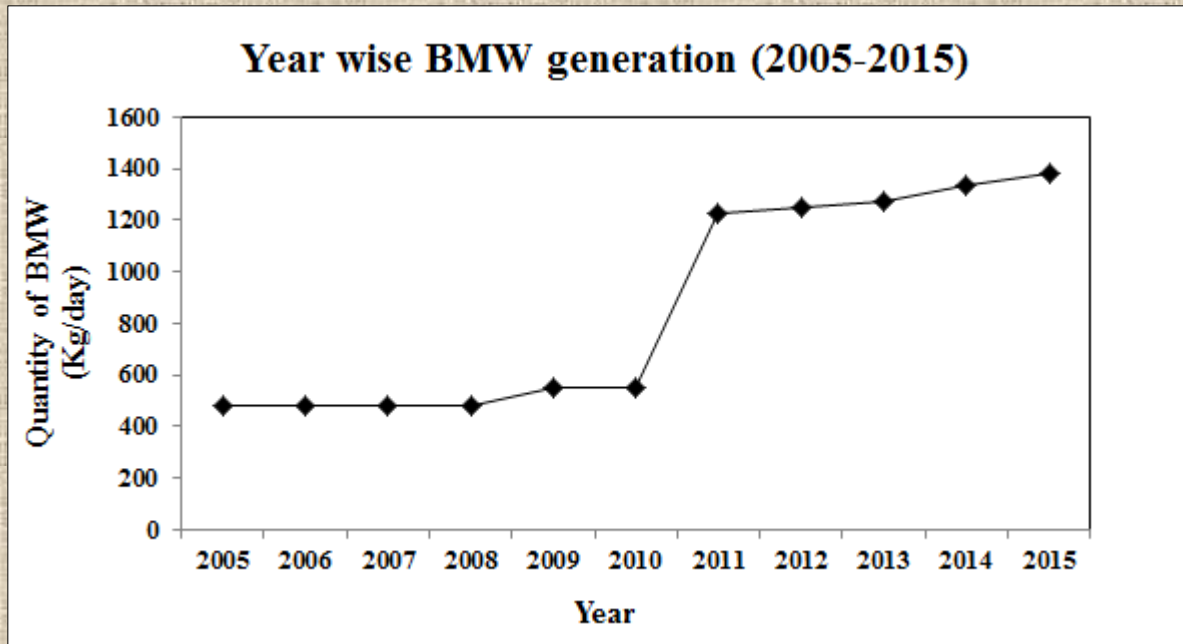


Fig. 3.1: Yearly variation of BMW generation during the period 2005-2015

On the other side, it can be followed from the **Fig. 3.2** that the quantities of treated Bio Medical waste are following an increasing trend from the year 2011 onwards. Establishment of impermeable Deep Burial Pits up to the level of Primary health centres, setting up of Common Bio Medical Waste Treatment Facility and Incineration Site at Hapania and plasma Pyrolysis at AGMC are improving the treatment system of Bio Medical waste in the state.

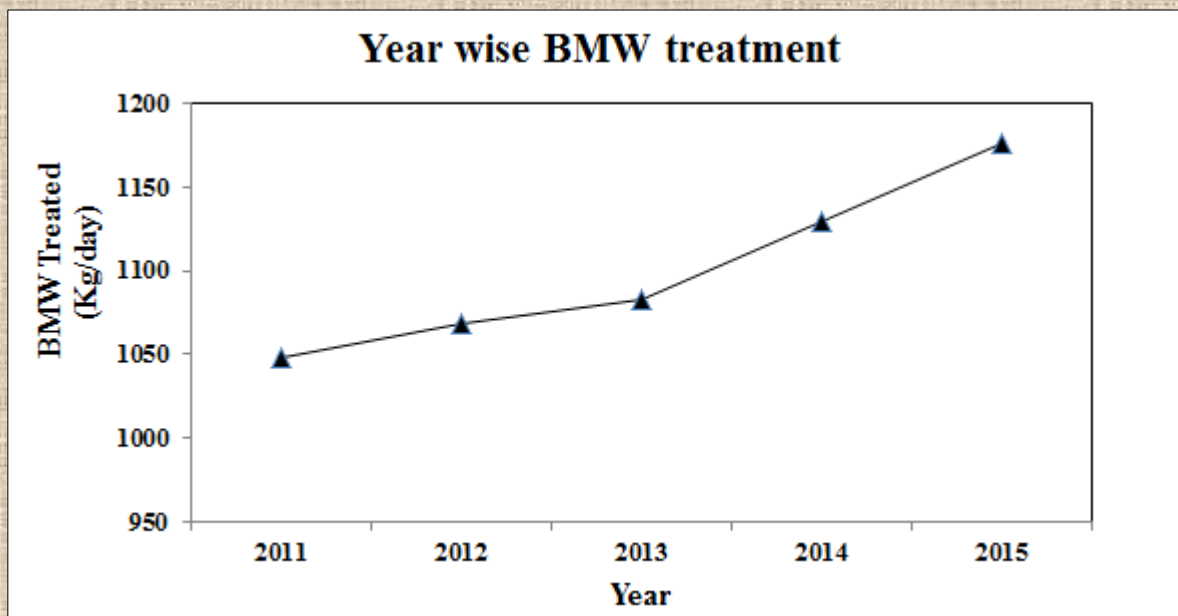


Fig. 3.2: Yearly variation of BMW treatment during the period 2011-2015

CHAPTER 4: HAZARDOUS WASTE MANAGEMENT

4.1 Scenario of Hazardous Waste Management:

Based on the review of the data as provided by the industries and additionally from the sphere visits, it's been discovered that no organized waste disposal system exist and also the venturous wastes generated by the industries area unit being managed indiscriminately. Some wastes area unit being drop beside municipal solid waste while not taking care of environmental protection. In general, the practices followed by the industries for the management of venturous waste with relevance handling, storage, transportation, recycle/ reuse/ recovery, treatment and disposal area unit given below.

4.1.1 Handling and storage

The hazardous wastes in the majority of the industries area unit are being handled manually. These wastes area unit usually hold on quickly on the ground at intervals the premises. Persons handling the hazardous wastes aren't given any personal protecting instrumentality

4.1.2 Transportation

The waste is transported from the plant premises to municipal dump site together with municipal solid waste. whereas transporting the unsafe wastes no guideline as mentioned in tips for management & Handling of unsafe wastes is being followed. there's no mechanism accessible to ascertain the situation of the places wherever wastes area unit being drop aside from municipal dump web site. Even the industries don't seem to be following the manifest system as planned in unsafe waste (Management & Handling) Rules, 1989 & Amendments whereas wastes area unit transported for selling/reprocessing or for selling. The industries commercialism their wastes outside are not taking any measures to assure that the tip users reuse commercialism their wastes

outside are not taking any measures to assure that the tip users reuse the wastes in setting friendly manner

4.1.3 *Recycle/ Reuse/ recovery*

It has been determined that some industries sell their wastes to outside agencies for reuse/reprocessing. Reuse/Recycling or Reprocessing of a number of the wastes being practiced generally in Tripura state in delineate below:

The spent oil/oily sludge from service and repairing units area being sold to different units like rice mills, that is employed for lubrication. The used lead plates from lead acid battery reconditioning units are sent to steel re-smelting units in different states for sick lead.

4.1.4 *Treatment*

No treatment is being given to the hazardous wastes are generated by the units. In most of the water polluting units, no effluent treatment plant exists, therefore there is no solid waste generation at present and the waste water is directly discharged in to the drain or open land.

4.1.5 *Disposal*

There is no organized waste Management facility available in Tripura state; therefore all the industries are disposing off their hazardous waste along with their municipal solid waste without taking any environmental protection measures.

4.2 Quantification of Hazardous Waste Management

The quantum of hazardous waste generation has been estimated by generating Waste Generation Factor (WGF). The WGF developed has been multiplied with the production capacity figures of industry provided through questionnaire under each sector and sub sector and the quantum of hazardous waste generated for each industry has been estimated. The sector wise quantity of hazardous waste generated of Tripura is provided in **Table 4.1**. The total hazardous waste getting generated in Tripura is approximately 267.63 tons per annum. This constitutes 264.59 tons of hazardous waste from automobile servicing sector, 2.59 tons from metal finishing and 0.45 tons from chemical sector.

Table 4.1: Sector wise quantity of hazardous waste generation in Tripura state

| Sl. No. | Sector | Sub Sector | Type of waste | Units | Total |
|---------|--------------------|------------------------|----------------------------------|-------|----------|
| 1 | Automobile service | Washing & Maintenance | Used/waste oil | kg | 238201.8 |
| | | | Oil filters | kg | 12370 |
| | | | Oil soaked cotton waste | kg | 7310 |
| | | | Empty containers | kg | 6726.4 |
| 2 | Metal finishing | Aluminium wire drawing | Used oil, Oil containing residue | kg | 2590 |
| 3 | Chemical | PUF | Waste & residue of PUF | kg | 450 |

CHAPTER 5: PLASTIC WASTE MANAGEMENT

5.1 Plastic waste management

Plastics are typically organic polymers of high molecular mass in which Carbon and Hydrogen are bonded with each other by some complex chain which makes plastic non-biodegradable in nature and needs more than 100 years to degrade. It can't be burned as it produces toxic gases and ash while burning. Moreover, it can cause die of aquatic and terrestrial animals by it's ingest, it's litters arrest the recharging the ground water aquifers, plastic carry bags choke the living organisms of the soil etc. cause harmful effect of the environment, TSPCB with the approval of the state Government banned the use of plastic carry bags (any kind) in the Tripura state.

As per the annual report information, the estimated plastic waste generations in the state are 30 MTPD and 32 MTPD during the year 2012-2013 and 2013-2014 respectively. On the other hand, the numbers of plastic products manufacturing industries are 31 and 36 during the year 2012-2013 and 2013-2014 respectively.



CHAPTER 6: SUMMARY

Waste management or Waste disposal is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc. For accomplishment of objective of solid waste management The Tripura State Pollution Control Board is continuously working with its all effort. It is true that the quantity of solid waste generation is growing rapidly with the modern urbanization hence to combat this problem TSPCB is also working effectively. To storage, collect, disposal of the solid waste to its final dumping ground many modern vehicles, tippers; tractors, tri-cycles etc. are used. Besides, different color coding R.C.C and plastic bins are placed at every accessible point so that the solid waste storage can be properly done. Although there is not sufficient scientific sanitary landfill is yet established in all of the districts of the state still proper awareness is being maintained during disposal of solid wastes to dumping ground for sustain a good and healthy environment around the dumping places. As said earlier in the report that many Municipal council and Nagar Panchayets have been newly created and many of the others are up graded so the quantity of solid waste generation is also increased. From the report we found that maximum solid waste (250 MTPD) was generated under Agartala Municipal Corporation. And minimum solid waste (1 MTPD) was generated in Jirania Nagar Panchayat and Melaghar Municipal Council during the F.Y 2015-2016. However, solid waste generation is found to follow an increasing trend in the successive years w.r.t previous years. On the other side in the year 2015, a figure of 1378.5 Kg/day Bio Meical Waste was generated in the state still maximum BMW (1176.1 Kg/day) (more than 85%) has been treated effectively by Bio Medical Waste Treatment Facility and Incineration Site at Hapania and plasma Pyrolysis at AGMC. Side by side, the total hazardous waste getting generated in Tripura is approximately 267.63 tons per annum. This constitutes 264.59 tons of hazardous waste from automobile servicing sector, 2.59 tons from metal finishing and 0.45 tons from chemical sector. And the most important sector, in the plastic waste management, State govt. and TSPCB has taken an initiative to ban the use of plastic bags and also taken some major steps for segregation and proper disposal of plastic bags to get rid of our environment from the hand of plastic contamination.