GAYA
City that Segregates
08th FEBRUARY 2019

WASTE SEGREGATION

GAYA MUNICIPAL CORPORATION, GAYA
Introduction to the City

- Gaya is one of the thirty-eight districts of Bihar state, India. Gaya city is both the district headquarters and the second-largest city in Bihar. Gaya is an important Tourist destination.

- It is surrounded by small rocky hills (*Pretshila, Ram-Shila and Brahmayoni*) by three sides and the river (*Phalgu*) flowing on the fourth (eastern) side. Geographically it is located on the intermediary zone coinciding with the transition of Gangetic plains to the Chotanagpur paltue.

- It is a place sanctified by the Jain, Hindu and Buddhist religions. Gaya is famous all over India for its religious importance for the ritual of Pinda-daan which is performed at the 45 holy sites in Gaya during a 15 day Pitrapaksha mela.

- Gaya is the second-largest contributor to the economy of Bihar, after Patna. Agriculture is the leading economic activity of the district.
The Adjacent map shows the Municipal boundary of Gaya Municipal corporation.

The Gaya Municipal corporation has a vast coverage area with different geographical scenario covering -

1. Plain land
2. Hills
3. River
4. Sarovars
The Adjacent map shows the present condition of ward mapping.

The Gaya Municipal corporation has 53 wards in total.

Population – 4,74,093 (As per 2011 census)

Municipal Coverage area: 50.17 Sqkm.

No. of Households –

As per New GIS mapping: 1,10,000
Gaya Municipal Corporation, Introduction:

- Gaya Municipal Corporation was formerly known as Gaya Nagar palika, consisting of 10 wards.
- It was rechristened as Gaya Municipal Corporation (Gaya Nagar Nigam) on 16th November 1983.
- The Gaya Municipal corporation has 53 wards in total.
- GMC plays an important role in cleanliness and waste management during 15 day long Pitrapaksha mela, which sees a footfall of around 3 lakhs per day.
- The scope of work of Gaya Municipal corporation is vast, with the responsibility of Solid waste management in the city.
Municipal Solid Waste Management

Municipal Solid waste consists of:

- Household wastes
- Construction and demolition debris
- Sanitation residue
- Waste from streets
- Commercial wastes
- Institutional wastes

With rising Urbanization and change in life style and food habits, the amount of Municipal solid wastes is increasing rapidly.

Most of the Municipal Solid wastes generated can be classified as:

1. Wet solid Wastes
2. Dry solid Wastes
3. Inert and Dust

Gaya Municipal Solid Waste scenario:

Total solid waste generated in Gaya Municipal area: 250 MT

Composition by Weight:
1. Wet solid Wastes: 75 %
2. Dry solid Wastes: 20 %
3. Inert wastes: 5 %

GAYA MUNICIPAL CORPORATION INTRODUCED SOLID WASTE MANAGEMENT THROUGH WASTE SEGREGATION SYSTEM
Before Introducing Waste Segregation System

- The Municipal Solid waste generated was disposed off in mixed way at ULB’s own dumping ground situated in Naili village 8 km from heart of the town.
- The waste were dumped without any segregation and processing.
- The situation due to unprocessed dumping was getting worse day by day, causing harmful effects on the environment.
- Need of solid waste segregation and Processing was felt and as an responsible ULB, Gaya Municipal Corporation introduced the Waste Segregation System in the City.
**Program Scope: Methodologies Adopted**

- Gaya Municipal Corporation conducted the Awareness program with the households for segregation of waste.
- Identification of gaps in segregating the waste at the household level.
- Listing the gaps and discussion with the informal sector workers and the residents on addressing the gaps.
- Conducting training/orientation programs to all stakeholders. This also included home composting activity training.
- Reporting on a weekly basis on each activity.
- Targeting Zero Waste Colonies.

**Day 1**
- Municipal Waste Generation

**D1+1**
- Waste Segregation at Source
- Waste Collection

**D1+5**
- Transportation
- Storage

**D1+90**
- Processing and Treatment

**D1+100**
- Disposal
GMC Scenario: Municipal Waste Generation

- There are various household solid wastes generated in the city which needs to be treated and disposed off.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Physical Characteristics</th>
<th>Range</th>
<th>Average (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Organic Waste</td>
<td>22%-44%</td>
<td>32.6%</td>
</tr>
<tr>
<td>02</td>
<td>Plastics</td>
<td>8%-14%</td>
<td>10.5%</td>
</tr>
<tr>
<td>03</td>
<td>Metals</td>
<td>0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>04</td>
<td>Glass &amp; Ceramics</td>
<td>0%-1%</td>
<td>0.3%</td>
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<tr>
<td>05</td>
<td>Rags/Cloth/Cotton</td>
<td>0%-7%</td>
<td>3.6%</td>
</tr>
<tr>
<td>06</td>
<td>Rubber &amp; Synthetics</td>
<td>0%-5%</td>
<td>1.1%</td>
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<tr>
<td>07</td>
<td>Leather</td>
<td>0%-2%</td>
<td>0.6%</td>
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<tr>
<td>08</td>
<td>Garden Waste</td>
<td>1%-8%</td>
<td>5.4%</td>
</tr>
<tr>
<td>09</td>
<td>Stone, Debris &amp; Boulders</td>
<td>1%-9%</td>
<td>4.2%</td>
</tr>
<tr>
<td>10</td>
<td>Paper</td>
<td>1%-6%</td>
<td>3.9%</td>
</tr>
<tr>
<td>11</td>
<td>Coconut Shells</td>
<td>4%-13%</td>
<td>6.9%</td>
</tr>
<tr>
<td>12</td>
<td>Organics Waste mixed with Sand &amp; Slit</td>
<td>18%-48%</td>
<td>30.9%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
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</table>
GMC Scenario: Waste Segregation at Source

The waste are broadly categorised as two types as per its properties:

1. Dry wastes
2. Wet wastes

- Wood and pencil shavings; kitchen waste like fruit and vegetable peels, tea leaves, coffee grounds, eggshells, bones and entrails, fish scales, and cooked/uncooked food; garden waste like flowers, leaves, branches, weeds and plant trimmings; sanitary waste

- Plastics, paper, glass, metals, tetrapacks, aluminium foils, rubber, thermocol, styrofoam, fabric, leather, rexine, wood, batteries, electronic items, bulbs, tubelights – anything that can be kept for an extended period without decomposing

Dry Waste
- Paper (newspaper, notebooks etc.)
- Cardboard & cartons
- Containers & packaging of all kind excluding those containing hazardous materials
- Compound packaging (tetra pack etc.)
- Plastics
- Wood
- Rag
- Discarded Clothing

Wet Waste
- Food waste of all kind including eggshells and bones
- Flower, fruit and waste including juice
- Vegetable peels
- Household garden/plant wastes
- Soiled paper (used toilet paper, paper towel etc.)
Gaya Municipal corporation has distributed household bins of 10 lit capacity to all the households.

Two bins were distributed to each household, one of Blue colour and other of green colour for Dry and wet wastes respectively.

Blue Bins: Dry Wastes

Green bins: Wet Wastes
GMC Scenario: Waste Transportation

Gaya Municipal corporation adopted two systems for the transportation of the collected wastes.

1. 8 Bin Tricycle – For Narrow lanes – 1 person (as Whistle blower and collector)
2. Auto Tipper – For Broad roads – 2 persons (1st as driver 2nd as Collector and Whistle blower)

As per the DPR Guidelines –
- Each tricycle covers - 200 household.
- Each Auto Tipper covers – 1000 households

Quantity of Tricycle and Auto Tipper in the City –
- Tricycle – 300 Nos.
- Auto Tipper – 77 Nos.
GMC Scenario: Waste Storage

Gaya Municipal corporation has identified four locations for the storage of the solid segregated wastes collected.

Total 53 Wards: Divided in 4 Zones -

1. Old GRDA Campus.
2. Gurudwara Bum Police Campus.
3. Ishwar Chowdhary Halt (Manpur).

GAYA MUNICIPAL CORPORATION
Has taken the GRDA Campus as a PILOT PROJECT

- Dry and Wet wastes collected separately was brought to GRDA storage point.
- Two open platforms were created for dumping the dry and wet wastes.
- Segregation of minor mixes were done.
GMC Scenario: Waste Processing (WET Wastes)

• For Treatment and processing the wet wastes were dumped in compost pits.
• As per UD&HD (GOB) guidelines, compost pits were constructed at GRDA Campus in size 4’ x 4’ x 4’.

• The capacity of 1 pit – 5000 kgs (50 kg/day upto 100 days)

• Quantity of Compost pits constructed:
  1. At GRDA Campus – 60 nos.
  2. At Naili Dumping ground – 180 nos.

• Bio Compost/Fertilizer produced: 15 %
• Time Duration – 90 days after dumping.
GMC Scenario: Waste Processing (Methodology)

- The wet waste was dumped in the pits in different layers for proper composting and high yield of fertilizers.
- Following is the pictographic view of sections of Compost pit.

Typical Compost Pit Section for composting of wet wastes:

- Layer of dry leaves, grass, husk
- 4" layer of wet wastes
- Layer of dry leaves, grass, husk
- 4" layer of wet wastes
- Layer of dry leaves, grass, husk
- 4" layer of wet wastes
- Layer of dry leaves, grass, husk
- 4" layer of wet wastes
- Layer of dry leaves, grass, husk
- 6" layer of cow dung
- Used Green coconut

Wet Wastes

Cow Dung

Leaves, grass, husk

Used Green Coconut Shell
GMC Scenario: Waste Processing (DRY Wastes)

- 17 Components are identified as dry wastes.
- After the dumping of dry wastes at the open platform, further Segregation is done.
- The 17 types of dry wastes are stored in 17 separate PVC boxes of 260 lit capacity.
- The main purpose of further segregation of dry wastes is to sell it separately to get higher cost of each materials.

As per analysis:
1. Mixed dry wastes generates ₹ 4/kg revenue.
2. Segregated dry wastes generates ₹ 10/kg to ₹ 200/kg

Some of the important dry wastes are listed above:
- Paper (newspaper, notebooks etc.)
- Cardboard & cartons
- Containers & packaging of all kind excluding those containing hazardous materials
- Compound packaging (tetra pack etc.)
- Plastics
- Wood
- Rag
- Discarded Clothing
GMC Scenario: Packaging and selling

- The Bio compost thus produced is taken out from the pits (in next couple of months).
- The compost/fertilizers are then put into Grinder to produce the granular and uniform size of the composites.
- Further the composites are moved through the shredder to separate the granular compost and unprocessed large size wastes.
- The large size wastes are thus again treated.
- The fine granular/dust compost/fertilizers are ready for packaging and selling.

Packaging Unit:
- Will be packed in 1kg, 2kg & 5 kg unit.
- Jute bags will be used for the packaging.
- Will be sold to open market as well as government departments.

Government Policies:
- Bihar Government:
  - As per the GOB guidelines, it is mandatory for Department of Agriculture to purchase the compost at fixed price of ₹ 6/kg.
- Central Government Incentives:
  - To promote Bio compost in cities, GOI has proposed a incentive of ₹ 1.5/kg.
- Minimum Revenue Generation:
  - GOB - ₹ 6.0/kg (Purchase value)
  - GOI - ₹ 1.5/kg (Incentives)
  - Total Minimum Revenue - ₹ 7.5/kg
CHALLENGES:

• Ensuring 100% door-to-door collection of Segregated Waste from each household of unauthorized and slum areas.

• Ensuring purchase of the dry waste from the waste collector on a daily basis.

• Ensuring proper segregation of the wastes at source as dry and wet wastes.

• Lack of awareness among public regarding the same.

IMPLEMENTATION:

• To Educate, Interact and Communicate with the real producers of household wastes especially the housewives.

• A team of 23 Shelf Help Groups (SHG) women was formed.

• Duty of SHG’s women:
  1. Reach every household of wards covered under Pilot project.
  2. Educate the house owners with live demonstration regarding the Identification and Segregation of Dry and Wet wastes.
Implementation by GMC

• Various Public awareness programs and workshops were organised.
• Public awareness campaigns were organised.
• Advertisements and moving auto with waste segregation and management posters were run in the city.
• Cleanliness campaigns were organised.
Implementation by GMC

Training program on Solid waste management at GMC
The works in field of Solid waste management/Segregation was recognised by “Forum of Cities that Segregates, A centre for Science and Environment Initiatives”

GMC was awarded for the works on Municipal Solid waste Management
शहर में गंगदी दिखी, तो कार्यवाह के लिए रहें तैयार : नगर आयुक्त

- निम्न सभाग्रह में कर्मचारियों के साथ बैठक कर दिये निर्देश
- कहा, सफ-सफाई से किसी तरह का सपाटता नहीं

संदेशदाता दर्षक

नगर आयुक्त का प्रभाव लेने के बाद शुक्लवर को जनाने के लिए अध्यक्ष ने निम्न सभाग्रह में कर्मचारियों के साथ बैठक की। बैठक में नगर आयुक्त ने कहा कि सफ-सफाई से किसी तरह का सपाटता नहीं किया जाएगा। गंगदी की निकाय भाग्येर गर्भावस्था करने पर कर्मचारियों के लिए तैयार रहें, श्रीमान ने कहा कि सभी लोग स्मार्ट फोन से अपसंदिध करें।

नगर आयुक्त का कार्य को मुलाकात करने में विभाग श्रीमान ने कहा कि अंतरिक्ष के संभावित उपर विभाग के लिए तैयार रहें। शहर में गंगदी की दिखाई, तो अपने सावधानी रखें।

उन्होंने अन्य वकीलों की अध्यक्ष किसी तरह के संदेश दे दिया है। शहर में स्मार्टफोन का उपयोग विभाग श्रीमान ने कहा कि अंतरिक्ष के संभावित उपर विभाग के लिए तैयार रहें।

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THANK YOU

GAYA MUNICIPAL CORPORATION

WASTE SEGREGATION