



## **Case Study on Some Positive Initiative for Solid Waste Management in West Bengal**

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### **Abstract**

Population growth, increasing urbanization and industrialisation and rising standards of living have all contributed to an increase in both the amount and variety of waste generated in most countries. Waste is a continually growing problem at global and regional as well as at local levels. A large number of India people are very unaware about the concept of waste management. They are used to throw the solid wastes in ponds, drains, fields, beside the road which not only make our country dirty but also it creates soil, water and visible pollution. Recently our Central Government has been taken a national level campaign which is named “Swachh Bharat Abhiyaan” covering 4041 statutory towns to clean streets, roads and infrastructure of the country. The cleaning programme aims to fulfill in objectives by 2<sup>nd</sup> October, 2019, 150<sup>th</sup> birthday of Mahatma Gandhi. But in India many local bodies, institutes take some positive initiative for solid waste management. The present study has been special focus on their initiatives. They are as follows:

- Barrackpore Municipality, North 24 Parganas, West Bengal
  - Nokari Panchayat, under Ranaghat II subdivision, Nadia, West Bengal
  - Rudrapur Paper mill, Icchapur-Nilganj Panchayat under Barasat I block, North 24 Parganas, West Bengal
  - Vivekananda Institute of Bio-Technology, South 24 Parganas, West Bengal
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**Introduction:** There is nothing to waste. Every waste is an asset. Solid waste management means reuse the wealth which is termed as “waste”. In our country the basic problems regarding waste management is unawareness and unwillingness of people about the term of segregation. In West Bengal, easternmost state of India, various panchayats, municipalities, factories, institutions take some basic initiatives to solve the problems. It has been discussed below. Here two reports of solid waste generation in India in various years have given below.

### **Municipal Solid Waste Generation in India (State-wise)**

Name of the State /UT	(a) Municipal solid Waste MT/ day 1999-2000	(b) Municipal solid Waste MT/ day (2009-12)
Andhra Pradesh	4376	11500
Karnataka	3278	6500
Kerala	1298	8338
Mizoram	46	4742
Rajasthan	1966	5037.3
Tamil Nadu	5403	12504
Sikkim	-	40
West Bengal	4621	12557

Andaman & Nicobar	-	50
<b>Total of India</b>	<b>52125</b>	<b>127485.107</b>

*Source: Based on CPCB's study conducted through;*

(a) EPTRI

(b) As reported by SPCBs / PCCs (during 2009-12).

### **Municipal Solid Waste Generation in Metro Cities / State Capitals**

Name of City	Municipal Solid Waste (Tonnes per day)		
	1999-2000(a)	2004-2005 (b)	2010-11 (c)
<b>Agartala</b>	-	77	102
<b>Bangalore</b>	2000	1669	3700
<b>Chennai</b>	3124	3036	4500
<b>Delhi</b>	4000	5922	6800
<b>Hyderabad</b>	1566	2187	4200
<b>Kolkata</b>	3692	2653	3670

*Source: Municipal Solid Waste Study conducted by CPCB through;*

a) EPTRI (1999-2000)

b) NEERI-Nagpur (2004-2005)

c) CIPET during 2010-11

**Methodology of the Study:** Data has been collected from various primary and secondary sources. Present study has been carried out in Panchayat area, Municipal area and Paper mill and Institution. The areas which are cover in the study are –

- Barrackpore Municipality, North 24 Parganas
- Nokari Panchayat, under Ranaghat II subdivision, Nadia
- Rudrapur Paper mill, Ichchapur-Nilganj Panchayat under Barasat I block, North 24 Parganas
- Vivekananda Institute of Bio-Technology, South 24 Parganas

The main purpose to select four different areas is to record a variety of solid waste management practice in these areas and at the same time their effect towards the surrounding environment. The survey was conducted through field level interviewing of different people (mainly farmers) from the Panchayat area, Municipal office and waste collectors, the Mill manager and workers & the Institutional officials and Faculty members.

### **Case Study – I**

#### **Village – Purnanagar, Nokari Gram Panchayat, Ranaghat-II Subdivision, Nadia, West Bengal**

The Purnanagar village under Nokari Gram Panchayat was purposively selected for recording solid waste management strategies. This village is very famous for floriculture. So here study had been conducted on bio solid waste management.

**Method of waste management:** The village mostly consists of two methods of waste management strategy. On one hand, organic fertilizer is produced from household wastes. This fertilizer includes kitchen wastes, cow dung, dry leaves as well as ashes. As the village basically comprises of flower cultivators, this fertilizer is then used in flower cultivation avoiding chemical fertilizers.

On the other hand, livestock wastes as cow dung is used as Bio-gas for cooking. The Bio-gas producing mechanism is named as *Deenabandhu Model*, consisting of inlet, submerged tomb and three chambers. For producing Bio-gas the cow dung is collected in a cylindrical pit and is mixed with water. These liquidities are then processed in a tomb-like submerged pit which produces methane as Bio-gas. The excreted material i.e. the slurry, except the methane content is then deposited into a chamber, which is a semi-solid waste. From the first chamber the waste, excreting the liquid is then

transmitted to the next chamber. After partial drying the waste is further transferred to the final chamber. From here, this waste is again used as organic fertilizer in agricultural purpose.

Plate 1: Solid waste Decomposition



Plate 4: Bio- fertilizer use in agriculture field



Plate 3: Farmers carrying Bio- fertilizer to the field



Plate 5: Rose cultivation with the use of Bio- Fertiliser



## **Case Study - II**

### **Ichhapur- Nilganj Gram Panchayat**

*Place: Rudrapur Board Mill, Rudrapur Village Gram Panchayat : Ichhapur- Nilganj Gram Panchayat District: North 24 Parganas State: West Bengal*

**About the mill:** Rudrapur Board Mill which located in Rudrapur village under Ichhapur-Nilganj Gram Panchayat is working on solid waste management. The mill established on October,2011. All the workers in this mill belong from the different villages of the Gram Panchayat. Rudrapur Board mill is totally depends on paper waste which they collect from the surrounding villages, shops, malls, waste collectors etc. They engaged some people to collect this wastes and they pay Rs.6.5/- for 1 kg waste.

#### **Procedure:**

**STEP I:** The solid wastes for example, Paper wastes are dumped into the pulper. The wastes are mixed with water within the pulper. Then the semi solid material is run through a pipe in a rolling machine.

**STEP II:** In the rolling machine, the semi solid wastes are cut according its size and loaded in van.

**STEP III:** In the next step the wet paper boards are taken to an open place, where they are dried. After drying, the boards are then again taken within the mill for rolling.

**STEP IV:** Then the paper boards are inserted into the roller machine for straightening.

**STEP V:** After straightening the board, two parallel sides are shaped in the cutting machine.

**STEP VI:** In the next phrase the paper boards are again inserted in the press machine for shaping the other two sides.

**STEP VII:** After pressing and shaping the paper boards, the final products are packed according their thickness of each board and tied with ribbons. Then the final products are sent to the market i.e Rajabazar market and other surrounding markets.

**STEP VIII:** The by-products are again taken to the pulper for the same process and some excess Paper wastes are use by the villagers as their fuel. But this amount is very low.

Thus solid waste management procedure is conducted by Rudrapur paper board mill working within Ichhapur-Nilganj Gram Panchayat.

Plate6. Dumped paper waste



Plate7. Pulper



Plate 8: Rolling Machine



Plate 9: Paper sheets getting dried



Plate10. Pressing Machine



Plate11. Cutting paper sheets



Plate12. Final product



Plate13. Mill laborers

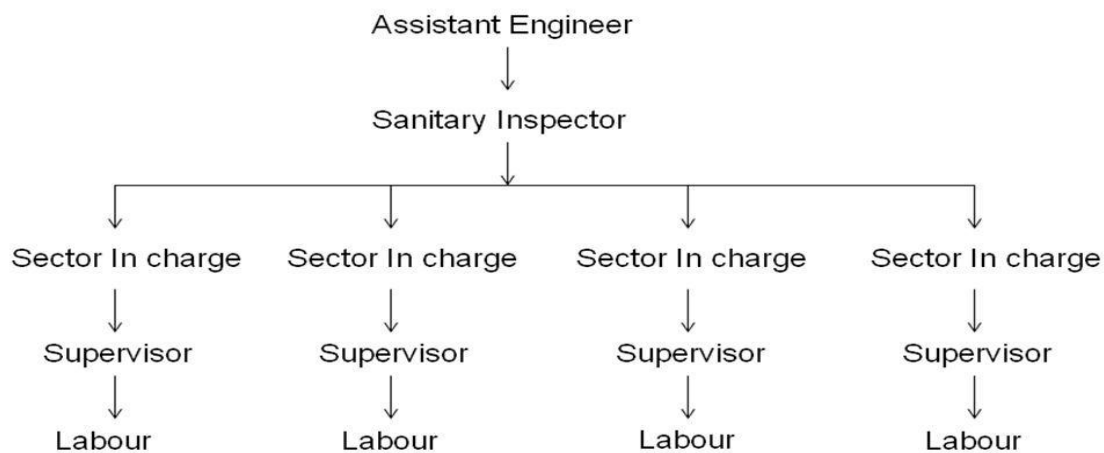


### Case Study - III

#### **Barrackpore Municipality**

**About the Municipality:** *Barrackpore* is located on the eastern bank of River Ganga (Bhagirathi), 20 KM away from Kolkata, the Capital city of West Bengal.

It lies to the south of West Bengal between 22o46' North Latitude and 88o23' East Longitude. It is bounded on the south by the G.C. Road. On the west lies the river *Hooghly*. The *Barrackpore* Municipality has been set up in 1916 under the then Bengal Municipal Act. Its population, as per the Census Report, 2001 is 1.44 lakh with an area of 10.16 sq. km. The number of House Hold is 31,715 having 4.5 persons per house hold. The entire municipal area has been delimited into 24 wards. The Municipality is administered by an elected Board of Councilors headed by the chairman who is also aided and assisted by Chairman-in-council Comprising 4 members including the Vice-Chairman, apartment from the paid management. North and East sides of this municipality are surrounded by *Palta Canal, Mohanpur & Patulia* Panchayat.

**Distribution of Work for Solid Waste Management**

**Source:** Barrackpore Municipality

Barrackpore Municipality is formed of 24 wards; these 24 wards are divided into 4 divisions. These 4 divisions are formed with 6 wards, each of which consist a Sector-in-charge in total of 24 Sector-in-charge. Under these Sector-in-charges there are supervisors and under each supervisor there are 7-8 municipal workers who work for waste management in the respective wards.

**Method of waste management:** The 24 wards which are divided into 4 divisions, those divisions are provided with 8 diffuse trailers. Regularly the municipal workers of each ward collect the solid wastes followed by 32 trips per day. The amount of solid wastes collected per trip per day is 1 metric tons.

Firstly, the solid wastes are collected from the households then the solid wastes are dumped in the roadside vat. All the 24 wards of the municipality consist of 24 vats. Solid wastes are collected from these vats then they are taken to the dumping sight at regular basis. The drain wastes are also taken to the dumping sight. The dumping sight of Barrackpore Municipality is located at *Muktapukur* which covers an area of about 5 acre.

**Problems:**

- The solid wastes are not segregated from the household level itself. The buckets which provided from the Municipality for waste collection are being misused.
- Local Beneficiaries are not included in the planning for the solid waste management.
- In 2011, a project for Vermi-compost was launched in Barrackpore Municipality. The project was carried on at the dumping sight. From here, manure was produced and supplied to various Gram Panchayats at the rate of Rs 1.50/kg. the manure was named as "*Jyibanidhi*". But due to lack of demand, the project was forced to be closed.
- Barrackpore Municipality consists of such obstacles as lack of people's awareness regarding waste management. For these, the program of solid waste management is hampered in Barrackpore Municipality.

**Case Study-IV**

**Vivekananda Institute Of Bio-Technology:** Vivekananda Institute of Biotechnology is a branch organization of Sri Ramkrishna Ashram, Nimpith has come up a long way since 1991 with support from Department of Bio-technology(DBT), Department of Science and Technology(DST) and

CAPART (Govt. of India). The institute is engaged in solid waste management within its campus since long.

Today there are two process of producing Bio-gas with solid wastes excreted from human waste, cow dung and also kitchen waste. The respective Models are –

- Deenabandhu Model.
- KVIC Model.

**Deenabandhu Model:** A domestic bio-gas unit is a digesting chamber where manure, from both cows and humans, ferments to provide biogas, through the release of methane. Biogas is seen as a clean fuel, and provides a feasible alternative to cooking gas.

**Structure and Procedure:** The main feature of a *Deenabandhu* biogas plant is the fixed underground digester chamber, constructed with a layer of bricks and an additional layer of cement mortar forming the roof above. Connected to the underground chamber is an inlet tank (labeled on diagram as “Mixing Tank”), through which manure is fed into the plant. The manure then ferments separating the slurry from the methane gas which rises and collects at the top of the digester tank, and is released through the gas outlet pipe.

**KVIC Model:** The Khadi and Village Industries Commission (KVIC) design has been developed over the past 15 years and is similar to the majority of systems currently operating in India.

The first KVIC Model was established in VIB 24.04.2005 which was financed by WBREDA. Two types of models present at VIB one of 40 m<sup>3</sup> and 60 m<sup>3</sup> capacity.

**Structure:** The KVIC system consists of a deep well and floating drum that usually is made of mild steel. The digester is made using burnt-clay bricks and cement. The cylindrical dome is made of metal sheets and moves up and down as it stores and releases the biogas. The digester is operated in continuing method and often vertically, almost cylindrical built. The decomposing space filled the ground and it has a dividing wall.

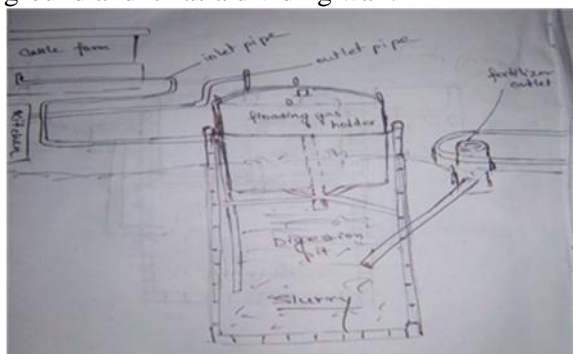


Fig : KVIC Model (60 m<sup>3</sup>)

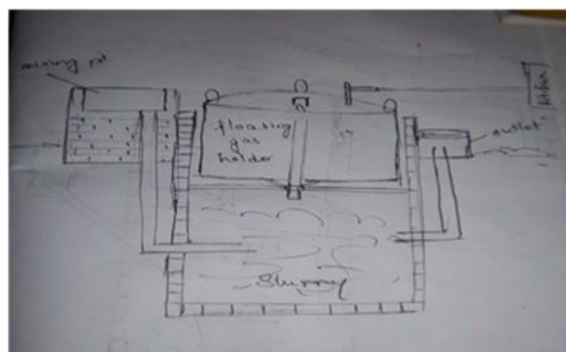


Fig : KVIC Model (40 m<sup>3</sup>)

**VERMI COMPOST:**

After the release of methane as bio gas species of earthworms are added with the Slurry excreted from the solid waste. It is rich in microbial life which converts nutrients already present in the soil into plant-available forms. Vermi compost is also known as “Black- Gold”. It is the easiest and less time consuming process of producing bio-fertilizer.

**Procedure:**

1. Bio-waste material + Microbes      —————>      Compost/Manure
2. Waste material + Microbes + Earthworm      —————>      Vermicompost

Plate14: Deenabandhu Model



Plate15. VIBT's Kitchen



Plate16. Slurry



Plate17. Vermi compost



Plate18. Excretion of final product



management practices aren't enough to be mentioned as a proper waste management in comparison with the Southern states except Vivekananda Institute of Bio-Technology (VIBT).

Practicing proper waste management program doesn't indulge a huge amount of money. All that needed is various compact processes as Vellore Model. In addition to this, various technologies are also needed to be implemented within proper time and without error as done in Warangal Municipality.

**Acknowledgement:** The authors are thankful to the Barrackpore Municipality, North 24 Parganas, West Bengal, Nokari Panchayat, under Ranaghat II subdivision, Nadia, West Bengal, Rudrapur Paper mill, Ichhapur-Nilganj Panchayat under Barasat I block, North 24 Parganas, West Bengal and Vivekananda Institute of Bio-Technology, South 24 Parganas, West Bengal, particularly the staff members of this organization, for providing logistic support, local transportation and hospitality to support this research. The authors are grateful to local stakeholders who shared the valuable information and time during the study.

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