

**SOLID WASTE MANGEMENT PROGRAMME
IN SHIVALIK NAGAR, HARIDWAR**

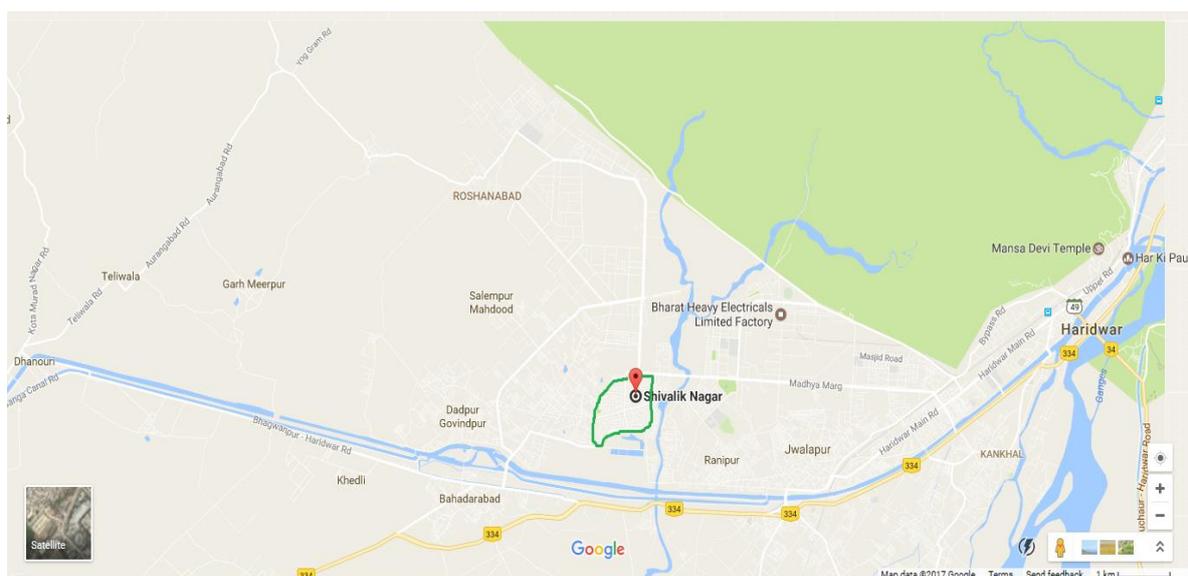
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1. Introduction

Haridwar is a city and the district head quarter of Haridwar District in the state of Uttarakhand. The city is governed by a municipal corporation which comes under Haridwar Metropolitan region. Although the city has historically been a center of religious importance, it is evolving into an economic hub as well with the fast developing industrial estate of State industrial and Development corporation of Uttarakhand (SIDCUL), and the township of Bharat Heavy Electricals Limited (BHEL) as well as its affiliated ancillaries situated nearby. As per the 2011 census, the metropolitan population is 310,796 where BHEL township has 18% (43252) and Shivalik Nagar have occupied 8 % (17307) of city population. In the year 2012, BHEL Township declared as separate Municipality named Shivalik Nagar Municipality. Shivalik Nagar is a city in the Haridwar district functioning as Nagar Palika Parishad (NPP), at the edge of Bharat Heavy Electricals Limited (BHEL) Township and the SIDCUL industrial estate of state government, and 10 km away from the Hindu pilgrimage city of Haridwar.

Shivalik Nagar was developed in the 1980s by Awas Vikas or State Housing Development Board, as a private residential colony for BHEL employees. Gradually it developed into a large colony in three phases, Phase I and Phase II and Phase III having 16 clusters with approx. 4500 household. It grew steadily over the next decade, with growing religious tourism in the Haridwar city, flourishing industrialization etc.



2. Need for intervention

A survey was conducted by the existing Partners of ITC Mission Sunehra Kal in a 5 km radius of the ITC Haridwar factory to understand the major problems faced by community. Thus 17 villages, 2 Nagar panchayat and 2 Municipality has been identified as the core area in Bahadrabad block of Haridwar district within the radius of 5 KM from SIDCUL area and villages of Ganga riverbank (Allotted by Govt.). Rapid Rural Appraisal, Focus group discussion, along with Household survey tools were used to understand the socio economic conditions and need assessment of the community. Among all identified problems Sanitation & Solid Waste Problem (31.48%) rated the highest.

As BHEL area has its own system of managing the waste, so ITC Started a waste management programme in Shivalik Nagar town. The average waste generation per day is 8 tons which comes 240 tons in a month. Out of this approximately 96 tons is organic waste.

In a study of the current practices of managing the waste in household level it was found that the residents dispose their waste in existing municipality dustbins and some private waste pickers service households once or twice a week. It was further found that due to a lack of organized disposal structure, there were a large number of open dumps, littering and burning of waste.

As such the Shivalik Nagar Palika has no waste management system or designated dumping area. Owing to these findings, ITC began an intervention on waste management in May 2016. The primary goal was waste management while inculcating a practice of zero waste dumps at landfills.

2. A. Selection of Partner

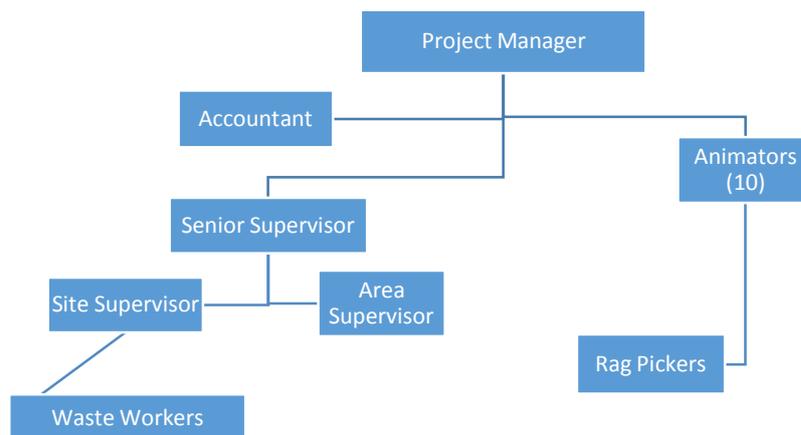
Exnora Green Pammal headquartered at Pammal, Chennai was selected as project implementation partner.

2. B. Objective

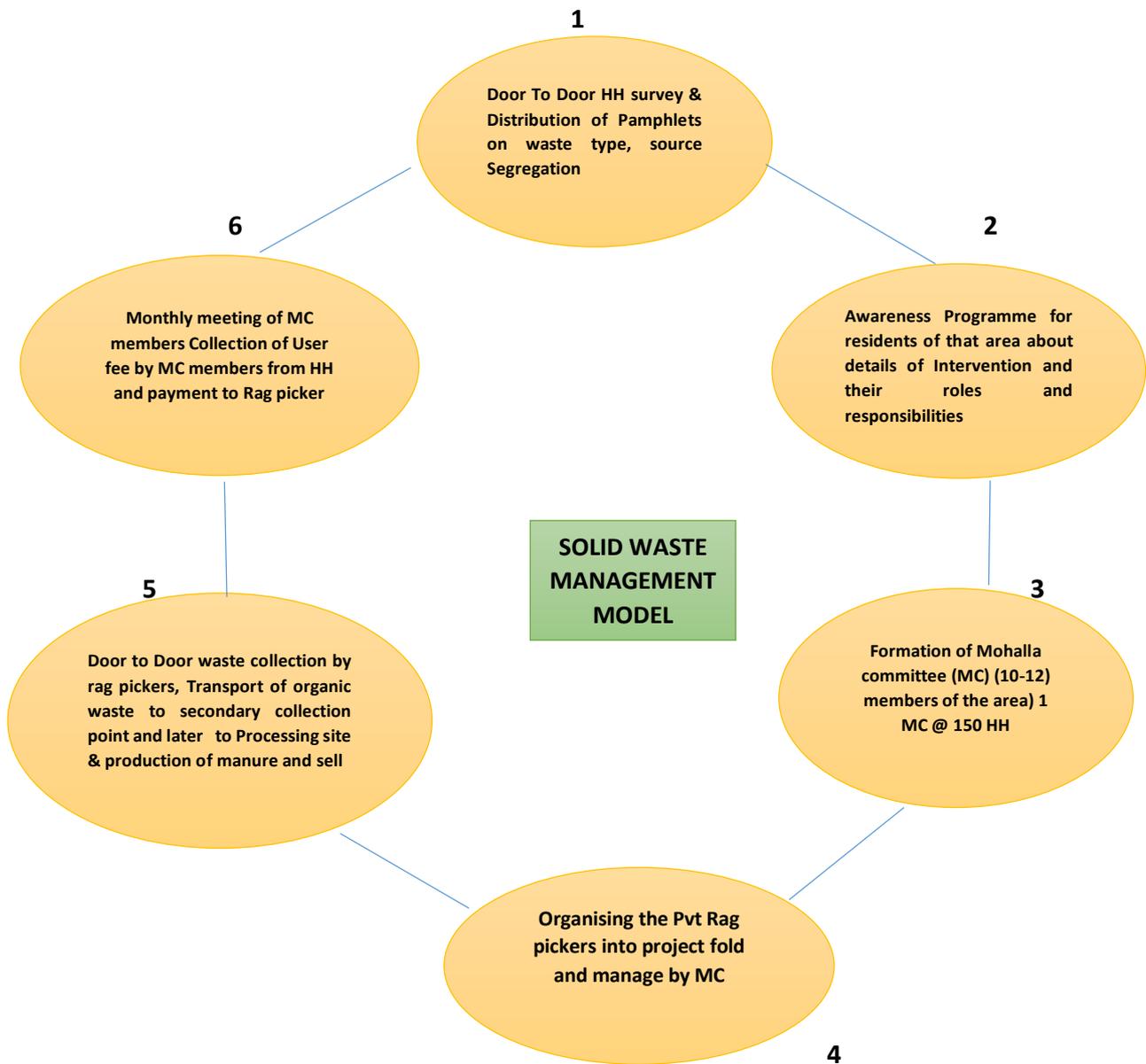
- Scientifically managing the waste with the ownership of community to minimise the landfill

- Create decentralised community driven Solid Waste Management (SWM) model
- Adherence to MSW rules, 2016 & generating awareness in community regarding SWM rule ,2016 and 3R principles of waste management (Reduce, Reuse, Recycle)
- Ensure 100% source segregation and out there of treating waste as a resource
- To empower community to develop clean & hygienic habitations

2. C. Human Resource Structure



2. D. Implementation Model



2. D. 1. Awareness through door to door visits

A door to door survey was carried out by the animator to know the number of households, streets, community halls of that area, current practice of waste disposal, amount of waste generated, segregation done or not etc. Following this, the animators conducted an awareness campaign by way of distribution of pamphlets and stickers. The stickers showed a classification of broad waste categories such as Organic, Inorganic, and Recyclable waste. The lady members of house are basically involved in this as they deal with waste at household level. The poster pasted in the kitchen and helps educating the members segregation at source.



2. D. 2. Awareness programme for Community members

During the household survey animators mark the active members of mohala and call all of them for awareness programme. One awareness programme is generally planned after survey of 150-200 HH in the nearby of their resident area. Prior notice of venue, date, & time given to all households. In the awareness programme points on what is waste, waste type, Current practice of disposal of waste by HH & its advantages & disadvantages, SWM Rule 2016, Role of HH, How to segregate, Intervention of ITC mission Sunehra Kal on handholding support to Municipality on Waste Management etc were discussed. The main motto is to aware the community on "My waste. My responsibility". Various methods of managing organic waste is described among residents which motivate them not to litter waste, adopt source segregation and composting of organic waste. In the Programme residents nominate the Mohala Committee members



2. D. 3. Formation of Mohalla committee

10-12 members of mohalla were nominated by self & residents on voluntary basis to form a Committee in the mohalla to keep an eye on implementation of SWM programme and make their area clean. Mostly the members were senior citizens, active male & female of the area. They were to not only monitor door to door waste collection in the area but also look into the no. of HH doing source segregation, no. of days waste collector worked, collect monthly user fee from the residents, and pay to the Rag pickers. Along with this some of them started decentralized Home composting and acted as a model for others. One Mohalla Committee was formed for every 200 households. The monthly user fee collected was handed over to Rag picker and some portion was used for the mass cleaning of park, streets etc. The Mohalla Committee supports the animator of that area to discuss regarding programme, Various issues on implementation, HH not doing segregation, Mass cleaning of their area, cleaning of drainage lines, plantations etc. Later on after three months Mohala committee of the area take whole responsibility on implementation of Programme. Till date we have formed 73 mohala Committees having 1007 members where women consists of 51% & male 49% of total members. One President, secretary, Cashier & also nominated by all committee members. The committee meets once /twice in a month as per the date decided by all of them in prior and discusses implementation of programme, issues and concerns.

Records Maintained at Mohala committee Level:

- Meeting Register: The Monthly Meeting minutes are recorded in Meeting register along with amount of user fee collected from no of HH, amount given to rag picker etc.
- Ledger: The Income & Expenditure statement of Mohala maintained in ledger.
- User fee Acknowledgement/Receipt Book: One Acknowledgement/receipt book kept with committee and acknowledgement of receive of user fee given to HH.

Sl.No	Name of the area	No of Mohala Committees	Male	Female	Total Members
1	Shivalik Nagar	23	218	92	310
2	Subhash Nagar	32	214	277	491
3	Tehri Vistapit	12	14	86	100
4	Roshnabad	1	10	1	11
5	Ramdham	5	37	58	95
	Total	73	493	514	1007



Roles & Responsibility of Mohala Committee Members

- Fixation of Monthly User fee amount of their area
- Holding of Monthly Meeting to discuss and review implementation of solid waste management programme in their area
- Collection of user fee from HH and giving to waste collector
- Follow up HH on source segregation
- Garden Cleaning, Street & drain cleaning, plantation & any other developmental activities in their Mohala

2. D. 4. Organising the Pvt Rag pickers into our fold and manage by MC

Previously the rag pickers were collecting the waste once or twice in a week and collecting money directly from HH as per their will. Existing rag pickers were identified at the planning stage of the project so as not to impact their livelihood. In certain cases where Pvt rag pickers were not there, Mohala committee and Project staff arrange the waste collector. After identification they were trained to collect the segregated waste from HH i.e. Dry & Wet. The Dry waste like plastic, paper, bottles etc. taken by them and support their supplementary livelihood. Basically Mohala Committee took charge of waste collector and hand over the tri cycle given from project to Waste Collector. The Committee decides the monthly amount of waste collector to given. Time to time various training programmes also arranged by waste collector as well as support for collecting day to day waste like gloves, uniforms, shoes etc .Some part of recyclable waste were not taken by waste collector , which is having no or very less revenue stored at recyclable shed in site. The wet waste collected in tri-cycles were transported to secondary Collection Point from there waste is transported through tractor and sent to centralized processing site.

2. D. 5. Collecting and processing the waste

After the Rag picker organised for the area, door to door waste collection started by rag pickers and HH give segregated waste in two bins, bags etc. The waste collection process continues for 6 days in a week. Each Rag Picker covers 150-200 HH on average between 7am to 11am. Tricycle is provided by project and two plastic bins kept to collect segregated organic waste and dry waste. SIDCUL, Haridwar have provided a land near polytechnic college having total area of 3390Sq.mt on lease for 5 years @ Rs 19493/yr. The wet waste is transported to the processing site for preparation of manure.



The rag pickers & shed workers are also provided hand gloves, face masks, full body jackets, shoes etc and other accessories as they are handling waste for 8 hrs on daily basis. After the waste is unloaded at processing site the processing site workers (8 in no.) again check the wet waste and remove if some other polythene or other materials are present in the wet waste. For decomposition of organic waste the Windrow composting method and Vermi compost method & is followed. The step by step process is explained below.



2. Door to door Waste Collection



1. Transportation of waste to Secondary Collection Point



3. Transportation of waste to central Processing Site



4. Formation of Windrow Bed using cow dung



5. Transportation of waste Bed to the Vermi compost pits & insert of earthworms



6. Production of manure



7. Central processing Site

For early decomposition cow dung is mixed in organic waste and it is done through bedding, called Windrow composting method. It helps in preparing large volume of compost within a cycle of 30-45 days depending upon the climatic condition. The standard bed size done for decomposition is 3*3*12ft (height*Width*Length). For maintaining the carbon and nitrogen ratio horticulture waste like leaves etc. is mixed from time to time.

After Decomposition or Pre-curing through cow dung the beds are transferred to Vermi compost pits. 62 Vermi compost pits are constructed in the site and each pit have a capacity of processing one ton decomposed waste to manure. The size of Vermi compost pit is 1.5*3*6 ft. (height*Width*Length). The temperature of decomposed waste is body temperature. After ensuring temperature 3 kilos of earth worm inserted into Vermi bins. So in this method excreta of worms which is rich in nutrition apart from many micro nutrition available in the excreta. The duration of harvesting manure from each bin will be after 3 weeks of earthworms inserted, when cured waste is inoculated with earthworms.

For each one ton of organic waste in Vermi bins the digested compost will be around 1/3rd or 300kg from each bins. Once the harvest is over, the worms will be separated and utilised for the next bin.

2. D. 6. Collection of User fee and payment to Rag picker

The MC members decides the user fee for HH as per their will and collect user fee from the residents accordingly from the Households. The user fee varies from Rs 30/- to Rs 80/- Permonth. The members of committee take responsibility for collection and paying wages to the waste collector. On an average 90% of HH are giving regular user fee and out of that Rs 30-40/- on average per household given to Rag pickers. Payment is basically done to rag picker in voucher and resolution is also passed in the committee for same. Rest amount is kept with the committee for other developmental activities in the area like street, drain, park cleaning, plantations etc.

3. Local Partnerships

Partnership with various stakeholders like Shivalik Nagar Municipality, SIDCUL Haridwar, Mohala committee members and community on day to day basis for implementation of solid waste management programme in particular area. Shivalik Nagar municipality has given approval for implementation of Municipal Solid Waste management programme in the area. The Executive officer, Municipality Mr Gurmeet Singh actively participates in various events of the programme and visits the site as well as gives required support. SIDCUL, Haridwar have provided the land near Polytechnic College on lease basis for 5 year for processing of waste. Time to time regional manager, SIDCUL also visits the site for monitoring of waste processing.



On 2nd Oct Executive Officer, Shivalik Nagar Municipality inaugurated the door to door waste collection in Shivalik Nagar



Time to time visit of The Executive Officer, Shivalik Nagar Municipality to central Processing site & Shivalik Nagar area

4. Coverage

In the year 2016-17, the programme started in Shivalik Nagar in the month of Oct and till March end 4467 Household of Shivalik Nagar were covered. Later on in 2017-18 additional 5746 HH of different areas of Shivalik Nagar Municipality i.e. Subhash Nagar, Tehri Vistapit Colony, Ramdham Colony, Roshnabad Colony were covered in door to door waste collection programme on phased manner.

Waste Managed in 2016-17

Particulars	UoM	Cum Total in MT.	%
Compostable Waste Collected	MT	479	68
Recyclable Waste Collected	MT	91	13
Non-Recyclable Waste Collected	MT	136	19
Waste Collected - Total	MT	706	100
Waste Composted (Manure Produced)	MT	11.5	
Municipal Dump	MT	136	19

Waste Managed in 2017-18 (Till Dec2017)

Particulars	UoM	Cum Total in MT.	%
Compostable Waste Collected	MT	686	62
Recyclable Waste Collected	MT	183	17
Non-Recyclable Waste Collected	MT	233	21
Waste Collected - Total	MT	1102	100
Waste Composted (Manure Produced)	MT	108	
Municipal Dump	MT	233	21

5. Collective of rag-pickers /waste collectors

In Oct total 13 rag pickers were involved in the programme and till date it has reached to 56 till December, 2017. The monthly income of Rag picker from user fee of HH varies from Rs 6000 to 11,000 with additional Rs 300 to 500 from sale of recyclables.

6. Community participation and ownership

The Shivalik Nagar SWM model is a community driven model. The Project team act as facilitator for enabling committees in awareness, source segregation, payment of user fee etc. After 3-4 months the Mohalla committee members are enabled to run the activities on their own.

7. IEC

Various IEC method used for Information, awareness, and Programme promotion. In 2016-17 total 112 no of awareness programme were conducted where 2893 people participated & in 2017-18, 33 awareness programme conducted till Dec, 2017 where 1808 community members were participated. Apart from awareness programme other IEC activities were carried out is described below.

For Resident & Mohala Committee Members

- Distribution of Pamplates and HH stickers
- Time to Awareness Programme
- Monthly Mohala Committee Meeting
- Rallies & Observation of various days
- Exposure to Processing site
- Display board in parks & streets

Public

- Display board in streets & wall painting in Site
- Rallies & Observation of various days
- Distribution of Pamplates



8. Source Segregation

The success of implementation of SWM started with sensitization of community members on Source segregation. It was difficult to change the habit of people but the animators, mohalla committee members & Swacch Bhai played a major role in doing the same. If any HH was giving mixed waste the Swacch Bhai demonstrate segregation and request the HH to adopt the same. Later on the mohalla committee members are also intervene and if still the resident was not adopting segregation he was warned that waste collection will be discontinued. Till date, out of coverage of 10213 HH, 8681 HH (89%) were giving segregated waste.

9. Financial sustainability: Decentralised model of composting

After ensuring Source segregation decentralised model of composting is emphasized and discussed with community for adoption to reduce the load of centralised waste processing and Financial sustainability. Financial sustainability of any cluster area comes after giving handholding support for 4-5 months so that they will be able to manage their programme. Because the MC directly manage the Rag pickers and in that period HH will be able to do source segregation & start composting in their home or locality which will help less manpower from project. Two models were designed for same i.e Home Composting and Cluster composting.

Home composting: The households were given training on composting their organic waste in their home by adopting various home composting methods using Khamba, bucket etc. Some of the households used Flower pots and Traditional pit method to compost their organic waste. The compost produced used in their garden. In this way only the recyclable waste generated from HH was given to Rag pickers. 23 households have started doing home composting in 2016-17 and additional 69 HH adopted the composting method in 2017-18 and till date total 92 HH have adopted Home Composting.

Area Name	Pit	Pot	Project (Khamba)	Traditional	Grand Total
Police Line			4	1	5
Ramdham			2		2
Roshnabad	4		12		16
Shivalik Nagar		6	12	13	31
Tehri Visthapit	8		30		38
Grand Total	12	6	60	14	92



Home composting adopted by households

Cluster Composting: Cluster composting is a way where 30-40 HH of particular area put their organic waste in the composter so that compost can be produced .This was started with one cluster in the year 2016-17 and later on another 7 clusters have adopted the same. Till date this process of composting started in 8 different places and managing organic waste of 551 HH. Only the recyclable waste generated from HH was given to Rag pickers. The size of composter is 3*3*6 ft. (height*Width*Length) and approx. Cost of this composter comes to Rs Rs.21000/- and it has the capacity to manage 2 tons of waste. The composter is made of fibre sheets, iron and tins in 4 angels. The waste collector of that area adds green wastes like leaves collected from parks and central processing site along with bacteria culture prepared at shed once or twice in week. It will take around 120 days for filling up completely and the compost harvesting process starts after 90 days. The compost so produced used by residents.



10. Major Challenges

1. Mohalla Committee Ownership – The ownership of Mohalla committees is a challenge as it takes time and some of the members of committee are not active.
2. User fee Collection – Some of the mohalla committees did not collect the user fees as they don't want to handle money & risks of community. Instead, they are dependent on the supervisor under the MSK project to collect the user charges. Some households simply pay the waste collector directly. Such a system does not promote accountability and is thereby not sustainable.
3. Segregation at Source – Approximately 89% of the families are giving segregated waste to waste collector. However, there are a few households that are yet to adopt this practice.

4. Home Composting – Till date only 92 families have adopted home composting and the larger groups are taking time to practice the same.
5. Community Composting – In each Clusters of Shivalik Nagar, a children’s park reclaimed from an open dump. The community composter to be placed in nearby parks. However, the residents have refused to do so as they are afraid these parks will turn into open dumps again. In other Places like Subhash Nagar, Tehri Vistapit colonies there are no places to keep the composter adjacent to resident and it will be quiet far from resident areas.
6. Centralised Composting – To process the waste a piece of land was taken on lease from State Industrial Development Corporation Limited, Uttarakhand. However, this land lies opposite to the Govt. Poly Technic Institute which has consistently been complaining about the bad odour and flies from the processing site.

11. Plans to Overcome

1. Mohalla Committee Ownership – The team is engaged in convincing some active persons and senior citizens to build a stronger and more accountable Committee. Time to time various exposure programmes, reward & recognition & Model Mohala are promoted to motivate the committee members
2. User fee Collection – The team is engaged in convincing the Mohalla committees who are not ready to collect user fees & handle financial risk. Transaction through bank account is promoted to maintain transparency.
3. Home Composting –Low cost house hold composter is devised locally which is coming to Rs 300/units .So most of them are eager to adopt the same by 50% contribution model.
4. Community Composting – Eight Clusters have adopted the community composting model and the team is highlighting the same in other clusters in order to convince other cluster to adopt the same.
5. Centralised Composting – The team is trying sort out the issue by consulting experts on how to control flies and odours.Sparays & other pest treatment used time to time for controlling the same.

	Key Performance Indicators	Frequency	UoM	Target	Achievement	Achievement
					(2016-17)	(2017-18)
2	HHs/Waste generators coverage in operational area	Monthly	No.	17500	4467	10213
3	Active Institutions				22	73
a.	HHs providing segregated waste	Monthly	No.	17500	3976	8681
b.	HHs adopting home composting	Monthly	No.	17500	23	92
c.	HHs providing service charge	Monthly	No.	17500	4422	9192
d.	Average service charge collection per HH	Monthly	Rs./HH	65	65	57
e.	Mohalla Committees formed	Monthly	No.	80	22	73
4	Efficiency Parameters					
	Waste going to landfill (baseline to be estd)	Monthly	%	15	19	21
	Cost / kg of waste collected	Monthly	Rs./kg	2	3.56	1.88
	Revenue / kg of waste collected	Monthly	Rs./kg	2	5.78	3.05

12. Key Performance Indicators

Cost /Kg = Total expenditure incurred in project from April to Dec⁽¹⁷⁻¹⁸⁾ i.e. (20.75 lakhs)/ Total waste Managed (1102 Mt tons)

But in 16-17 only the activity cost has been taken into consideration for calculation.

Revenue / kg =

Total revenue generated (HH user fee + Compost sale+ user fee from hotels) / total waste collected (1102 Mt tons)

The revenue /kg has decreased mostly for two reasons

- 100% user fee is not collected in every month
- Average amount of user fee/HH has been decreased from Rs 65/- in 16-17 to Rs 57/- in 17-18.

We have covered Shivalik Nagar in 16-17 and now we moved to other areas of Shivalik Nagar Municipality like Subhash Nagar, Roshnabad (Govt official resident colonies), and Tehri Vistapit Colony, Ramdham Colony which are not so much well off society.

Month wise HH coverage & Service charges collected in 17-18					
Name of Month	HH coverage	HH Providing service charge	User fee collected (in Rs)	Average service charge collection per HH (in Rs)	% of HH giving Service charge
April	5301	4581	293580	64	86
May	5787	5787	294431	51	100
June	6011	5591	331501	59	93
July	6264	5915	349641	59	94
August	7090	6119	350941	57	86
Sept	8696	6892	399716	58	79
October	8921	7124	421912	59	80
November	9415	8523	463774	54	91
December	10213	9355	493654	53	92
Total	10213		3399150	57	89