Solid Waste Management in Rural Areas

A Step-by-Step Guide for Gram Panchayats

A Companion to
The Facilitators of Swachh Bharat Mission (Gramin)

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Foreword

When economies go after indiscriminate market-based growth and the people go after a consumerist culture, the apparent side-effect is 'unmanageable waste generation'. There was a time that this was considered as a phenomenon of the West; and later of the cities of the fast emerging economies; and currently it is everywhere including the villages in India. The villages in general and those on the periphery of cities and towns in particular are at the frontline as far as indiscriminate and unmanageable waste generation is concerned. The concern is that at the end of the day, all the garbage falls on the lap of the Gram Panchayat (GP) to clean it up.

'Sanitation and street cleaning' is one of the basic functions of a Gram Panchayat, and they should make arrangements for attending to it. The Swachh Bharat Mission (SBM-Gramin) requires every Gram Panchayat to put in place a functional waste management system. Most of the State governments also encourage the GPs to chalk out a plan for SWM and practically start managing solid waste in a scientifically acceptable manner. We find that the GP functionaries as well as the SBM facilitators at the grassroots level are desirous of putting in place a waste management system at the local level. But, not many successful units are around to get an exposure, and learn from. And those that have taken off, with all enthusiasm, have not fully got out of the turbulence to be able to communicate their experience confidently.

At the moment there are a few SWM units in Tamil Nadu, Kerala, West Bengal and in one or two GPs in Gujarat and Rajasthan that are understood being managed successfully. These GPs have a lot of practical suggestions to share with others GPs and SBM facilitators who are earnest about creating a system to manage solid waste at the Gram Panchayat level. Dr P SivaRam, and Dr R Ramesh from the Centre for Rural Infrastructure (CRI) of the NIRD&PR have observed directly, and held long interactions with the people behind the success in these places, and have documented their work. This handbook is an outcome of a series of case studies done of SWM Units that are managed admirably by GPs across States in India. For easy grasp of the SBM facilitators and GP functionaries, the authors have presented it as a Step by Step Guide. It would be my pleasure to recommend to the SBM facilitators to draw ideas from this effort, customize to their respective contexts, for successful enablement of a clean ecosystem for all the people.

Dr W R Reddy
May 2016 Director General

Preface

Solid waste management has become a practical necessity in rural areas too. Next to becoming Open Defecation Free (ODF) villages, the Swachh Bharat commitment demands rural households to dispose of garbage in a scientifically sensible manner. Domestic refuse from individual households should not become a cause for unsightly streets and unhealthy rural environment. An essential requisite for a healthy rural environment and quality living is the Gram Panchayats (GPs) should put in place an arrangement for garbage collection and disposal in a manner that is socially acceptable and technically sound. In the absence of an effective system in place, it is unjust to blame the households of irresponsibility.

The Government of India (GoI) through the Ministry of Drinking Water and Sanitation (MDWS) has geared up the initiatives to facilitate such a process. Handbooks and Field Manuals have been introduced for GPs to draw ideas for implementation. Many of them are elaborate and useful with several workable ideas. The purpose of this handbook in your hand is very simple – enable doing. This is very narrowly focussed. The focus is on 'workability' given the other responsibilities of a Gram Panchayat. We have made this handbook more an action-oriented one for field workers, rather than covering everything that one should know about solid waste management.

The focus is on purpose i.e. *clean villages*, and not getting enamoured with and bogged down by the ideas of converting waste into resource, and the associated complexities. Resource recovery is a brilliant idea not only environmentally but also economically. Those GPs that are already converting waste into resource, and those that have taken up to doing it are most welcome. That is great and just right. In India, for the nature of villages and the mental makeup of Panchayat functionaries, we must consider that one model cannot work in all the 2,38,617 Gram Panchayats in India, hence this handbook. The focus here is to present ideas that are very simple to follow and at the same time technically flawless.

There are successful cases of solid waste management in a few places reported by NIRD-PR, CEE, CSE, WSP, MoRD, State governments and others. Those doing it successfully must be encouraged, and they can be called 'unique'. Successful practices witnessed are excellent sources

for providing lessons on what works and what does not work. However, the authors are wary of unaware generalisation without sufficient probing into how one GP is successful while many others in the neighbourhood fail. Often enough, our problem about writing success stories is that we put more emotion and less intellect in it. Consequently, we fail to take into account other factors such as the context, the leadership, supportive district administration or a local NGO that have played the vital cog. In other words, we report a case study, as though it happened exactly with the same independent variables we identified, with no extraneous or intervening variables coming into play. And wonder leisurely: 'why this successful model fails in other places'.

Studies conducted by NIRD&PR of solid waste management projects across the States proved beyond doubt that *the amount of income generated by converting waste into products helps meet hardly 20 per cent of the expenditure incurred, if done meticulously perfectly*. Certainly, the financial return on investment need not (and should not) be the sole criterion for determining the success of solid waste management endeavours. However, the Panchayat Presidents who are the prime anchor persons of these efforts at the GP level should not get it wrong or be misguided. They are sure to get disappointed if they construe that they are going to cover the entire expenditures [in managing solid waste] out of the income earned through sale of vermi-compost / products or other recyclable wastes. Another perspective is the Return on Investment (RoI) need not be calculated in terms of financials; rather we should measure it in terms of savings to the 'natural capital'.

Clean, and green villages is a splendid dream. Every Gram Panchayat must go for it. In such a journey 'prudence and pragmatism' should hold the steering wheel. As the title of this handbook conveys, this is a step-by step guide for Gram Panchayat functionaries that shows the way to garbage-free village in five steps. In addition to the inputs / suggestions we received during a national workshop at NIRD&PR, we have also extensively drawn from various guidebooks on this subject, especially of those from the Ministry of Drinking Water and Sanitation (MDWS). Practical suggestions to improve the ideas presented here shall be gratefully acknowledged.

R Ramesh | P SivaRam

April 2016

List of Abbreviations & Acronyms

CRI	- Centre for Rural Infrastructure
DRDA	- District Rural Development Agency
GoI	- Government of India
GP	- Gram Panchayat (Village Panchayat)
HH	- Household
MDWS	- Ministry of Drinking Water and Sanitation
MoPR	- Ministry of Panchayati Raj
MoRD	- Ministry of Rural Development
MGNREGS	- Mahatma Gandhi National Rural Employment Guarantee Scheme
NIRD&PR	- National Institute of Rural Development and Panchayati Raj
ODF	- Open Defecation Free
SLWM	- Solid and Liquid Waste Management
SLRM	- Solid and Liquid Resource Management
SWM	- Solid Waste Management

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Useful Materials / References

Chapter – 1

Solid Waste Management in Rural Areas

Introduction

The domestic waste generated in rural households of India is increasingly becoming an issue of serious concern. Though, solid waste generated in rural areas is predominantly organic and biodegradable, it is becoming a major problem as the waste generated is not segregated in-situ and is of the order of 0.3 to 0.4 million metric tons per day, as reported the Ministry of Drinking Water and Sanitation (MDWS), Government of India. Inconsiderate littering causes poor environmental sanitation resulting in unhealthy quality of living. Therefore, domestic-refuse should be handled responsibly. In order to manage waste in a desirable way, there should be a functional waste management system in place. Without a functional waste collection and disposal system at the Panchayat level it is arbitrary to hold individual households responsible, or blame them of irresponsibility.

The Government of India (GoI) as well as many State governments are looking up to Gram Panchayats to come up with a working system to manage solid waste in rural areas. We must admit the fact that 'some' Gram Panchayats have been successful in managing solid waste, while 'many others' have had a short stint and faded away. The NIRD&PR took up the task of collecting and coming up with an array of practicable models of solid waste management, which GPs can choose from, and take up appropriately for implementation.

This handbook provides lessons from 'good practices in solid waste management', presented as a step by step guide. It will help formulate models and systems for solid waste management (SWM) that can serve as practicable system for Gram Panchayats to take up for implementation. The purpose of this handbook is not merely adding to the existing knowledge on SWM, but to provide practicable ideas for implementation.

The Steps in Solid Waste Management

In this chapter we present the steps an aspiring GP can follow in order to take up solid waste management (SWM). It follows a step-by-step approach. It starts with *preparatory arrangements* required, and goes up to *monitoring the progress* a given GP is making in SWM.

Step – I: Preparation

1) **Panchayat functionaries meeting:** The Panchayat President, Vice-president, secretary, and other ward members should express their willingness and support, and resolve to take up the cause of clean GP within certain time period (one year).
2) **Gram Sabha Meeting:** Gram Sabha should discuss about (and pass a resolution) what it means to be a clean village; in what way each household may have to cooperate etc. This can include resolutions such as: (i) cloth bags to be used, and avoid use of carry bags; (ii) tea stalls to use only stainless steel glasses and no use and-throw cups; (iii) a by-law in this regard can be prepared and passed as well (see Model by-law in Chapter – 2).
3) **Community Education:** Various segments of the community need to be educated. It must include the households, SHGs, shopkeepers, tea stalls, local restaurants, school children, marriage and community halls etc. It is good to meet each group separately. Community education must essentially include: what are bio-degradable wastes; and what are non bio-degradable wastes? Which ones are recyclables; what hazardous wastes are; what is meant by *primary segregation* that the households are supposed to do?
4) **Identify infamous spots**: Generally street corners and empty land in between houses are vulnerable spots to become 'undeclared dump yards'. Every household silently assume that spot for dumping household wastes. There are three things that need to be done about such places. (a) First of all, identify such infamous places / spots; (b) the garbage heap in such places must be moved to some existing landfills; and (c) fencing can be done to prevent future misuse, or if it is a common land, put some plants or tree saplings to grow. If funds are available put up a

swing for children to play there. Keep that place occupied, it should not be seen being empty.

Box – 1: What is a Sanitary Landfill?

A common misconception is people show a place being used as *dumpsite*, and they call it *landfill area*. Dumping is neither scientific nor sanitary. Landfill needs to be scientifically done without affecting the groundwater and the environment. There are certain types of non-bio-degradable wastes that cannot be recycled. They may be sent to sanitary landfills. The main consideration while planning for a sanitary land fill is prevention of negative impacts on human health and environment. A low-lying site away from human settlement is selected. A gravel bed is made so as to prevent leaching, if any, not to contaminate the soil or water, nearby. After every filling or in periodical intervals a sand cap or clay cap is put on that, which prevents gases such as methane / carbon dioxide from causing air pollution. If we can reduce what ends up in the landfill to 10% to 15% through reduce, reuse, recycle process, it can be considered as a good management practice. Forty five per cent may go to gasification plant / composting; and 40% may become recyclables.

5) **Community Preparation:** Each household must be provided with three buckets – Green, Blue and a Red one. (a) The Green bucket is for disposing of kitchen refuse, leftover food and other **wet waste**; (b) The Blue bucket is meant for keeping **dry wastes**; and (c) the Red bucket is for keeping **hazardous wastes** like batteries; fused bulbs etc. For an illustrative list of wet waste / dry waste / hazardous waste see Box – 2 (Waste Category). The wet waste in the Green buckets shall be collected daily morning (or morning and evening) as decided by the Gram Panchayat. Collecting two times a day (morning and evening) renders handling easy. That is when the waste is still fresh and has not started emitting smell, effective segregation becomes easier, than handling wastes that are stale and decayed. The dry waste shall be collected separately, and the hazardous waste shall be collected from households once a month, for instance, on the 5^{th} day of every month. If found more, it can be made once a fortnight. The chance of hazardous waste being more is very remote.

Box – 2: Waste Category (Bin it Right)

Wet Waste (Green)	Dry Waste (Blue)	Hazardous Waste (Red)
Vegetable peels	Soap covers / pockets / sachets	Mosquito repellent refill bottles/ Mosquito repellent mats
Fruit peels	Empty shampoo bottles	Expired medicines
Rotten fruits and vegetables	Empty perfume bottles / containers of deodorants / shaving creams	Tablet covers / Syrups bottles
Leftover food	Milk covers	Any medical discard
Used tea / tea bags	Used door mats	Sanitary napkins
Used coffee ground	Used tooth brush	Children's diapers
Egg shells	Chocolate wrappers	Used condoms
Coconut shells (including tender coconut shell)	Butter wrappers	Used razor / razor blades
Mango kernel & any seed	Used mop cloth	Old batteries
Coconut fibre	Ghee / oil pockets / cans	Fused bulbs / tubes / electrical items
Used flowers / dry flowers	Package / polythene covers / Plastic covers	Broken glasses / ceramics
Spoiled spices	Newspapers / card boards	Empty cans of toilet cleaners
Floor sweeping dust	cosmetics containers	Expired cosmetics
Meat & non-veg remains	Styrofoam	Cockroach killers / spray cans
Expired bread, biscuits and other food items	Broken stationery like used pens, pencil sharpener	Old printer cartridge / CDs
Hair	Empty cans of floor cleaners	Rusted iron pieces
Garden shrubs	Kurkure / Lays packets	Used odonil bottles
Floor sweeps	Unusable shoes /	Old Electronic items / parts
Road sweeps	Sachets (of shampoo, creams etc.)	Pieces of wires, old chargers, old pen drives
	Bisleri kind of water bottles	Old paints / old household chemicals / cleaners
	Used tooth paste tubes etc.	Insecticide sprays / leftovers
	Broken household plastic items / and toys	Toxic rejects
	Metal tins, and cans (e.g Pepsi Coke cans) – Aerosol cans	Cotton/ tissue papers used for medical purpose
	Small tubs like the ones used for yogurt, cheese, jam	Empty cans of lubricants used for car / bike.
	Pieces of aluminum foils	
	Old brooms	
	Paper napkins, Tetra pockets	
	Destroyed old cushions	
	Leather, rexene, rubber	
	Iron pieces	

Community Preparation through IEC

The GP residents hold the key for success in solid waste management. Human propensity to respond to a call for any change generally does not receive the same level of cooperation and support from all corners. First of all, it requires inscribing in the minds of the community that the GP is serious about it; secondly, it should be personally convincing for them to play their part and cooperate; and thirdly what they witness as manifested behaviour of GP functionaries should gradually strengthen their trust in our efforts. All these require a series of IEC campaign.

SBM facilitators, in association with GP functionaries, need to plan for a series of IEC campaigns to educate the residents on: why scientifically manage solid waste; and how *segregation at the household level eases the entire process of managing waste at subsequent stages.* The responsibilities of the residents are spelt out clearly in page no. 24. The community members / households should be clear about it at the outset. The suggestions that follow may be of help to conduct IEC campaigns for this purpose.

Ultimately, what is expected of the Residents?

- Every household / resident should get habituated to properly segregating waste into three different categories (wet / Dry / Hazardous) before handing them over to waste collectors.

  (This sounds very simple, but is not easy to make EVERYONE practice it. Thus, the need for IEC)

Information	Education	Communication
(*Know what, why and how*) Knowledge Awareness Ability (Making people aware)	(*Self-regulation, Self-correction, Practice, Responsible well-being & civility*) (Triggering people to practice, by undoing undesirable behaviour and adopting desirable / healthy behaviour)	The methods, tools, and techniques (media) used to pass on information, and impact on practice so as to make one behave like an educated person. One can be illiterate but still be 'educated'

Suggestive IEC Activities

1. **Waste Bins Distribution with handbills:** The GP shall arrange to supply three different colour bins to all the residents. This must be used as an opportunity to supply also a

handbill explaining the purpose of three different colour bins, and seek residents' cooperation. Motivate them with your reasons: *why is this important in a village?*

2. **Students Orientation:** The local school children are a magnificent source of enthusiastic human resource, the power of which can be tapped for this purpose. To do this, they need a brief orientation on SWM, and what is this SWM plan trying to achieve within a GP. Conduct orientations for them in separate groups, and plan with them how they can involve themselves in this IEC exercise. Generate ideas as well. They can be alternatively used in IEC, IPC activities depending upon their availability. School children also can prepare IEC materials on a competition held for them at school. They tend to own up such materials prepared by them, and put them to effective use.
3. **Cultural Evening:** Cultural evening with messages on waste management. Cultural evenings may be organised in the villages. In between the cultural programmes, we can take 15 minutes to sensitize the residents on waste segregation, waste reduction etc. The cultural programme will continue, then again for 15minutes Solid Waste Management (SWM) plan shall be put across to the residents. At the end of the programme, the GP President shall sum up asking for the cooperation of residents for proper management of wastes, and not throw wastes in street corners.
4. **IPC (Interpersonal Communication):** This helps in a face to face situation for the school children and sanitation motivators to demonstrate to the residents what are bio-degradable wastes (wet)? and what are non-biodegradable (dry) wastes? What are recyclables; what hazardous wastes are? What is meant by *primary segregation* that the households are supposed to do? How this goes further into making gas, vermi-compost etc. The students can use their knowledge, creativity and innovation.
5. **SMS Alert:** An SMS alert may be arranged with mobile service providers (IDEA and Airtel) 'alerting residents every morning with a message on 'waste segregation'. This should go on at least for 15 days at the launch of the programme; then once in three days; and then reduced to once a week.
6. **Educative Information:** The sanitation workers can also politely educate the residents where they mix up waste (without segregating) especially because they are not clear as to how to segregate.

7. **Educative Inspection:** The Sanitation Inspector who goes for monitoring the works of the sanitation workers makes direct observation of how residents respond to the call. He can also use that opportunity to educate the residents who are unaware or are unwilling to spend time on segregating.
8. ***Rangoli* Competition:** *Rangoli* competitions can be announced at GP level. Prizes can be given to the biggest and the best *rangoli*. Prizes can be announced at three levels: (i) household level, (ii) street level, and (iii) habitation level. People tend to clean up the streets in front of their houses, and their streets in their enthusiasm to bag prizes.
9. **Clean the Commons Campaign:** Cleaning up the schools, ICDS Centres, infamous spots where people usually chuck their waste. Such places can be cleaned up through a special campaign. Innovative ideas must be put to use so as to sustain the cleanliness of such places – by making vulnerable /infamous spots to be used as playground for *kabbadi* players*;* or plant some trees, and fence the area. If it is a bigger area, children's park can also be planned (like it has been done in Ibrahimpur GP in Telangana State).
10. **Announcing Prizes & Gifts:** As part of local festivals institute some awards such as, 'Street of the Year Award' or 'Best Residential Locality Award'. It must be given every year so that people have some encouragement to keep clean, and tend to question those irresponsibly throw waste in street corners.

Step – II : Planning

1) **Area Survey:** Estimation of the nature, type and quantum of wastes generated by different category of people viz. households, tea stalls, restaurants, marriage halls, vegetable market, fish market, bus stand, temples, and schools etc. is necessary to be able to plan for collection, transport, and manpower requirements. For households, average waste generated can be estimated. But, with regard to other stakeholders such as restaurants and markets a site-visit might be required to assess the waste they generate daily. The existing arrangement for waste disposal should also be studied. See Annexure 3 & 4 for further clarity on this point.
2) **Material Planning:** Tri-cycles or (solar) battery operated vehicles for waste collection (one vehicle with two waste collectors for every 150 households, for instance), uniform and gears (jacket, gloves, cap, water bottle, first aid kit) for the workers, segregation

shed, compost yard for wet waste, storeroom to lay in dry waste, tools and equipments. See Chapter - 3. Detailed Project Report preparation.

3) **Manpower Planning:** SWM is a labour intensive work. We need two workers per 150 households. That means with each garbage collection vehicle two workers can be deployed, who can help each other. They can together cover 150 households every day. They may cover 150 HH in the morning (7.00 – 10.00 am) and 150 HH in the evening (4.00 – 7.00 pm). Two hours can be spent in secondary segregation at the shed - one hour in the morning and one hour in the evening. The experience in some places is that poor and destitute women are trained in this work. Those already involved in rag picking are also recruited and trained. Selection and training are important because wrong selection shall require frequent recruitment.
4) **Technical Planning:** This is about processing and treatment of wastes collected. This guide does not suggest elaborate treatment methods. It suggests to go for simple windrow composting with wet waste, and if possible to go for vermi-composting. The dry waste can be segregated and what can be sold as recyclables may be sold to merchants who deal in scrap sales /waste recyclable items periodically. The rest may be sent to a sanitary landfill (See Box – 1). This is explained in detail in Step – IV and in Annexure - 4. See Diagram at page 17.
5) **Financial Planning:** This involves two types of costs. (a) Capital cost for setting up the facility, and (b) Operational cost for meeting out the recurring expenses month after month. Capital cost pertains to point No.2 above; and Operational cost pertains to points No.3 & 4 above. See Box – 3 for details. The financial planning necessarily must involve a budgeting exercise too.

   Budget is an estimated income and expenditure statement. In other words, this is a dry run of the expenditure to be incurred, and the likely income to be accrued by the GP through the proposed SWM activity. This is a very essential exercise that Panchayat functionaries must do before actually venturing into 'real action'. This shall indicate the likely expenditure to be incurred, and what are the sources of income available to cover the expenditure so that the venture becomes financially sustainable. A blank budget format is given below.

Box – 3: Income and Expenditure for a Solid Waste Management Project (It is worked out assuming that this project is for 300 Households)	
Items of Expenditure	**Possible Income Sources**
A. One-time Expenditure (Capital Cost)	1. Service charge
1. Baskets (900 numbers) - Green, Blue, Blue	2. Sale of compost items
2.Tricycles - 2	3. Sales of recyclables
3.Compost pit, segregation shed	4. Fine and penalties
4.Uniforms, gloves, gaps, whistle	
5.Tools & equipment	
B. Recurring Expenditure (Operational Cost)	
1. Supervisor Salary	
2. Sanitary Workers Salary	
3. Consumables / bleaching powder etc.	
4. Repair and maintenance	

NOTE: This is the stage where GPs need to look into the feasibility of resource recovery from waste. Income generation through sale of products (such as vermi-compost) from wastes is a source of income in some Panchayats. Some GPs do SWM Project, on social enterprise mode only – meaning the expenditure is offset by another source of income to the GP. The income from sale of compost, and service charge meet only a portion of the expenditure. Please visit SWM Unit in Mudichur GP, Tamil Nadu (see a briefcase at Annexure -1); and SLRM Unit at Kurudampalayam GP, Coimbatore, Tamil Nadu (see a brief case at Annexure – 2) for firsthand experience on these aspects.

A Tentative Budget of Income and Expenditure for a month

(Assume: 900 Households / 3600 population)

Expenditure items	Rs.	Income Sources	Rs.
Sanitation workers salary (Rs.6000 x 6 workers cover 450 HH in the morning & 450 in the evening)	36,000.00	Service charge (900 HH x Rs.40)	36,000.00
Supervisor's salary (1 person)	6,000.00	Shops, restaurants, marriage halls etc.	6000.00
Consumables (bleaching powder etc.)	200.00	Sale of compost	2000.00
Repair & maintenance of vehicles	1000.00	Sale of Recyclables	2000.00
TOTAL	**43,200.00**	**TOTAL**	**46,000.00**

Note: It assumes that every household and every shop keepers pay service charge without fail. The budgeting exercise must be done even before kick-starting the SWM implementation at ward level or GP level.

Step – III: Organising

1) **Manpower:** Recruit the manpower as required by the plan. One experience is that very few local persons volunteer to work in dealing with garbage. It is good to recruit destitute women and those who are willing to take up such tasks. In some of the successful SWM projects, wherever the authors of this handbook paid visit, we could notice destitute women from the neighbourhood villages, and men outside the State working. Often they are recruited from faraway places. In such cases, they stay in a place given by the GP. There are places where actual rag pickers have been recruited and trained. They get orientation and trained so that they are ready to take up the task. While doing a training need assessment it is advisable to go by 'task-based session plans'. Regarding compensation, each worker has to be paid at least Rs.150 per day or the minimum wages as prescribed in MGNREGS.

2) **Materials & Facilities:**

The physical facilities required for setting up an SWM are as follows. We need to organise these things so as to commence work.

- Land to construct the segregation shed plus composting yard or the vermi-beds
- Setting up a compost shed / segregation yard
- Baskets / Containers for households – 3 per household
- Green / Blue / Blue Baskets (one for wet waste; other for dry waste and a third one for hazardous)
- Tri-cycles for every 300 households – 1
- Sanitation Workers (Janitors), 2 workers for every 300 households (to cover 150 HH in the morning and 150 HH in the evening)
- Uniforms (cap, gloves, whistle)
- Tools and equipment (broom sticks, bins, tin, sheets etc.)

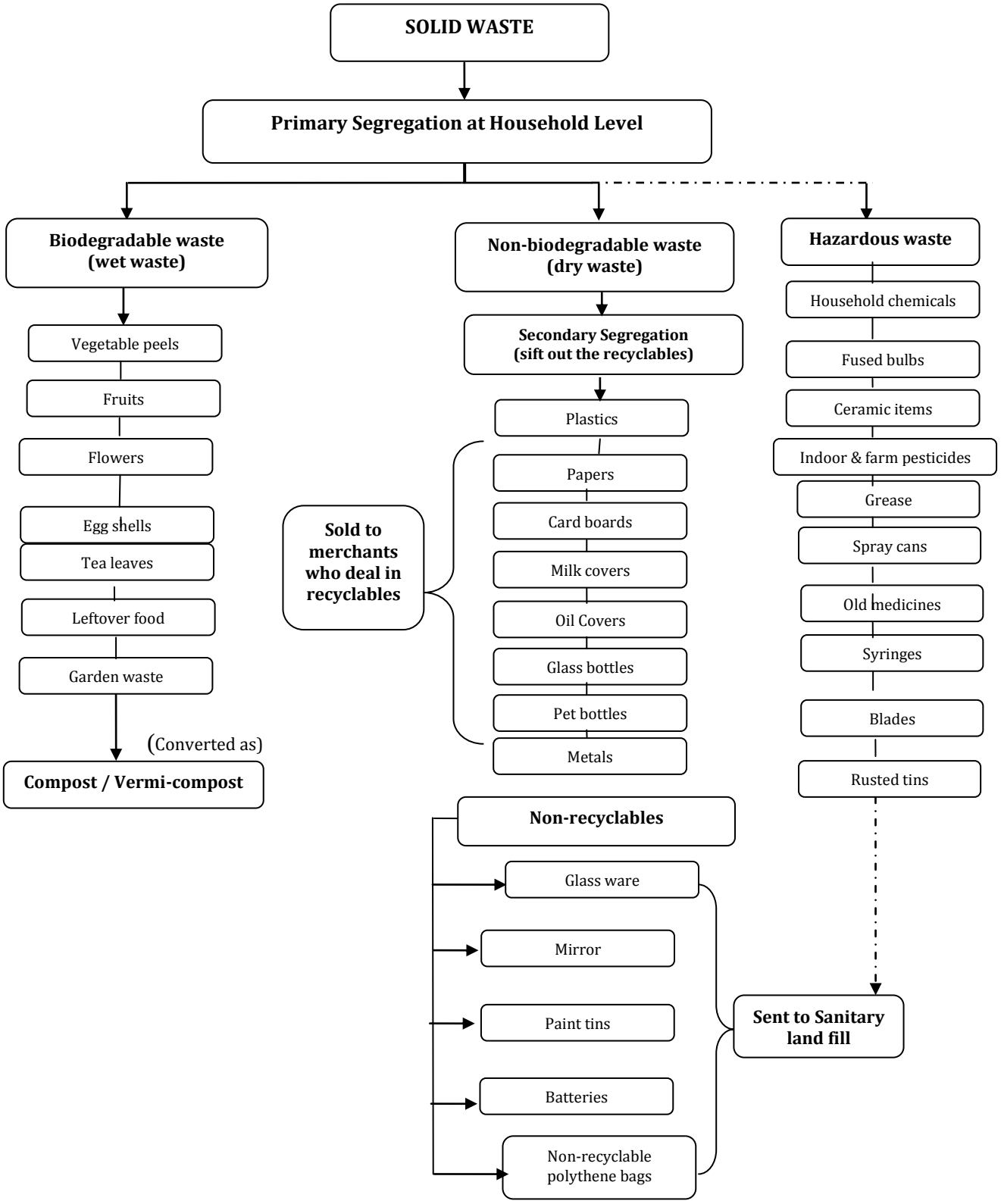

Diagram – 1: A Simple Solid Waste Management Model

3) **Technology:**

This can include three things in the context of SWM. **First,** what vehicles are to be used in waste collection – are they simple tri-wheelers, or battery operated vehicles etc.? **Secondly,** the technology to be used in treating the wet waste / bio-degradable waste – are they going to be converted into simple compost or vermi-compost? **Thirdly,** how the landfill is to be located and where it is going to be set up? Depending upon what technologies we choose, we need to organise materials and funds to procure such materials.

4) **Funds:** The State Governments through centrally sponsored schemes like Swachh Bharat Mission (Gramin) makes grants available for construction of facilities required for solid waste management. However, in the event of this fund being insufficient, GPs have approached CSR (for instance, Kurudampalayam GP, Coimbatore district, Tamil Nadu) and NGOs (for instance, Mudichur GP, Kancheepuram district, Tamil Nadu). There are also instances where the District administration and DRDA have found other sources of funds to assist setting up solid waste management facilities. This is about initial investment. The real challenge is about covering the operational expenses (running cost) of the unit month after month, paying workers salary, maintaining collection vehicles etc.

There are income sources in an SWM unit viz. sale of compost and service charge collection etc. One general complaint from GPs that are already involved in SWM is the irregularity in service charge payment - that the irregularity is up to 30 per cent. Therefore, the income from sale of compost, and service charge cover only a portion of the expenditure. As mentioned elsewhere in this handbook, where GPs have taken up the task of SWM, they follow social enterprise model only – meaning the expenditure is offset by another confirmed source of income to the GP. For instance, in Mudichur GP in Tamil Nadu, they offset the loss incurred in

SWM against the income they earn from sale of drinking water through RO Plant. See a case study in Annexure – 1 of SWM Unit in Mudichur GP in Tamil Nadu.

5) **Coordination:** Running an SWM unit is a time-consuming and long-drawn out task. Once started, it must go on and on. If left unattended for four-days, things will fall back as bad as how it was earlier. Therefore, the GP must constantly keep in touch with the community; the sanitation workers; and watch out the supportive income sources that help compensate the loss incurred in SWM etc. Poor coordination may result in ineffectuality, eventually resulting in unsustainability.

Step – IV: Implementation

1) **Segregation at Source:** The households must have sufficient knowledge of segregating bio-degradable from non-bio-degradable wastes. Since we have covered about *preparing the community* at Step – 1 itself, at this stage we assume that the community members know how they should participate and contribute. First of all, primary segregation takes place at the source, namely at the household itself. If this is done properly, it will considerably reduce the work in secondary segregation. Otherwise, it is an unpleasant task to lay hand in wet waste that is more than 8 to 12 hours old, which has already started decomposing / decaying. The households keep kitchen refuses in a Green Bin.

2) **Collection:** The sanitation workers indicate their arrival by blowing a whistle. The Green Bin is emptied into the cabin meant for it in the tri-cycle. Wet wastes are collected every day morning from 7 – 11 am; or in the evening from 4.30 – 6.30 pm. During the collection, the sanitation workers progressively perfect the community on what should be kept in the Green Bin, and what should go into the Blue bin, and what are hazardous items, and how they should be disposed safely.

3) **Secondary Segregation:** The tri-cycle reaches the segregation shed where the garbage undergoes a secondary segregation. In secondary segregation the sanitation workers sift (pick and choose) the 'recyclables' from the lot received. The discarded ones in the process are non-recyclables, which along with hazardous waste reaches the 'sanitary landfill'. For an explanation on sanitary landfill, please see Box - 1.

4) **Facility for Treatment & Treatment of Waste:** Construct two composting yards of 3 x 5 metres of one metre height in single brick masonry. It can be above the ground level. It does not require any plastering. There needs to be a roof (tin sheet) over them considering the rainy days. That means both the composting yards are under one roof. One composting yard can be used for 60 – 75 days. When it is nearly full in two months time, cover it with sand, and start using the second one. By the time the second one gets filled, the garbage dumped in the first yard has become compost and is ready to go to field. These two pits can be used alternately like in a twin pit toilet. We do not impose vermi-composting considering the work and additional workers required to maintain it. GPs may opt for vermi-compost, if they can manage time, and additional worker(s). All that it might require are: (i) turning around the garbage once in ten days or so; (ii) ways to control insects and flies from breeding; and (iii) how to control odour. Windrow composting is the easiest. To get to know about various methods of composting 'Government of India (2015), *Technological Options for Solid and Liquid Waste Management in Rural Areas*, published by MDWS, Swachh Bharat Mission (Gramin)' is a good reference material.

The recyclables can be sifted and stored separately for sale to scrap dealers. When a considerable volume is accumulated, they can be sold. Arrangement may be made for scrap dealers to visit the site once in two months or so.

5) **Service charge Collection:** Service charge collection from every household is very essential to cover the operational expenses. The Sanitation Supervisor (or Panchayat Secretary) should take responsibility to sit in a designated Cash Counter at the GP Office, at least four hours daily to collect service charge from households (for household drinking water connections, for solid waste management, house tax etc.). People get habituated to visiting the office and paying, once the system is established, and when the community members are sure that the GP Office is definitely open from 12.00 noon to 2.00 pm; and again from 5.00 pm to 7.00 pm. If this is irregular, people tend to think poorly of the system, and do not adhere to paying, citing 'closed GP office' as a reason.

Step – V: Monitoring and Correctives

1) **Household adherence:** The households must adhere to segregating waste at source. They must be sufficiently educated. There might be initial hiccups. The sanitation workers must be sufficiently trained in order to educate the community members patiently and stop being intolerant on them. If primary segregation is properly done, a considerable work for the sanitation workers shall reduce. Ensure households adhere to proper segregation and cooperate.

2) **Feedback from Households:** The households must have the GP Sanitation Supervisor's / GP President's mobile number to offer suggestions on the system, or make complaints in the event of sanitation workers being irregular or behave irresponsibly.

3) Feedback from Waste Collectors: The GP President, GP Secretary, and the GP Sanitation Supervisor should talk to the sanitation workers / waste collectors on the response of, and the cooperation extended by the households. If their intervention is necessary to solve some of the problematic households, or habitual delinquents, they must be attended to and dealt with appropriately.

4) **Physical Verification:** The GP Sanitation supervisor should make visits when sanitation workers are on duty, collecting waste from households. It helps solve some of the problems. Similarly, the GP President should make visits whenever he has time. Initially the GP President may have to visit the wards, often enough, so as to build confidence in the households. It communicates to the households how earnest the GP President is about the solid waste management system.

5) **Corrective Measures:** The GP functionaries should hold a discussion with the Sanitation workers, and representatives from households on corrective measures required to make the system more effective. The system can keep improving as months pass by, as the GP gains experience in managing solid waste.

Certain Assumptions and Imperatives

- Waste collection once started there is no way it can be halted for two days or so in the course. It must go on regularly on time. Garbage at households left unattended for two days, people tend to lose confidence in the system, and all the garbage shall come to the streets.
- The GP must explore the availability of scrap dealers in the area / vicinity and get in touch with them.
- The community education (even at the door steps of households) must regularly take place wherever necessary in order to make them adhere to the new system. This must go on until 100 % of the households adhere to the system.
- A convenient service charge collection system must be put in place. Service charge must be collected month after month, without fail. If it is fixed as Rs.40 per month, the GP may also let open the option of some households wanting to pay Rs.120 once in three months. It is better to have it pre-paid, rather than post paid.
- Especially when it comes to treatment of wastes, do not get carried away by promises made by high-end technologies. Technology should be simple, facilitative and cost-effective.

- In the same vein, one can try to test the pragmatism behind the principle '*waste-into-resource conversion*', at the same time we shall not lose sight of the fact that '*simplicity is the hallmark of demonstrability*' and complexity is a drawback.

Despite repeated education, some families do not segregate wastes properly, and it happens in most communities. As a result of this, if the sanitation workers started dumping 'all the wastes together' in the collection cart, they are making way for a reverse journey. That's an indication the system is gliding towards 'failure'. The sanitation workers are as vital as the households are, to be able to spell success. To quote an incident, one sanitary worker in Kurudampalayam (see annex – 2) said with a lot of unease: "*sir, many of these housewives are thinking I am collecting wastes and garbage from them, I feel sorry that they hold an incorrect perspective of what I am doing. They lack an understanding that I am collecting resources from them to be converted as usable products"*. It spells, why Kurudamapalayam is successful.

Actionable Agenda for Households

Your GP aspires to become Clean and Green within one year from now. We seek the cooperation of the residents by following certain simple steps in handling wastes at household level. Your adhering to this - with a little extra effort - shall help your GP to ground a scientific practice in waste management. It is in your interest; and it is in the interest of the community you live in.

3.1 Responsibilities of Households

The following are responsibilities of households / residents

1. Each household shall segregate waste into wet waste (kitchen waste - GREEN) and dry waste (BLUE), and Hazardous Waste (RED), and put in the bin given specifically for each purpose. This is called primary segregation, which will be the responsibility of the residents. The foundation for success or otherwise of this effort absolutely lies at this stage.

Wet Wastes (GREEN): Kitchen-refuse such as vegetable peels, fruits, flowers, egg shells, tea leaves, including leftover food, old bread, fish bones, leaves, garden shrubs, and others easily degradable items.

Dry Wastes (BLUE): plastics, papers, card boards, shampoo bottles, empty cans/ tins / toothpaste tube / worn out toothbrush / milk covers, oil covers, glass bottles, pet bottles, broken toys, caps of mineral water bottles, iron pieces, etc.

Hazardous waste (RED): Under this category items frequently discarded are: (i) used batteries, (ii) children's diapers,(iii) used-napkins (and such items). Other items under this category could include household chemicals / cleaners / fused bulbs / tubes, broken mirror and broken ceramic items, residual paint/ indoor and farm pesticides, grease, spray cans, shoe polish, expired medicines and other pharmaceutical items / syringes, needles, sharps, blades, rusted tins etc.

Note: It is courteous if we can wrap especially the items (ii) and (iii) mentioned under RED waste above in an old newspaper, and stick a small RED colour cello tape(stamp-size enough!)' so that it gets appropriate handling without any mess.

2. Vegetable peels, fruit peels, egg shells, used tea leaves, leftover cooked vegetables / food may be put in wet waste bin (Green). But never in a use-and throw cover; never knot it, please. Either give them as such or wrap it only with old newspaper.

3. It is always good to wash inside of a milk pocket with water. Washed milk cover renders it easy for the sanitation workers to deal with it. [Never throw empty milk covers on the street. The stray cows, buffalos and calves tend to chew up and eat them because of the milky smell on the cover. Accumulated polythene covers in their stomach prove deadly].

4. As far as possible leftover food items such as fish bones, mutton and chicken bones may be given to cats / dogs, if available at the households. This is a way to deal especially with leftover food at household level. If not, these items may be put under wet waste (GREEN Waste), which after crushing (by a crusher) can be fed either into a gas plant or allow them to decompose along with the wet waste you convert as compost.

5. Certain items such as sanitary pads, children's nappies, and condemns shall be wrapped in newspapers, or some papers available (put a red X [cross mark]) or stick a piece of RED cello tape, before it is handed to the sanitation workers. Such marking helps easy identification so that the sanitation worker shall handle it appropriately.

6. Please avoid putting used sanitary pads in plastic carry bags and knotting it. They should always be wrapped in old newspapers or some paper available. Similarly, please avoid putting kitchen waste (vegetable peels etc.) in carry bags and knotting it.

7. The sanitation workers (in uniform & cap) shall visit every household with a cart / tri-cycle, and blow a whistle to let the residents in that area to get to know that the waste collection vehicle has arrived. It is the responsibility of each household to give the

three baskets to the sanitation workers, who shall empty each basket in separate containers they bring / in partitioned vehicles.

8. The residents who repeatedly give mixed up waste (dry /wet / hazardous etc. together) shall be classified as Type – 2 residents and dealt with accordingly.

9. Complaints, if any, from the residents may be sent through SMS to the Sanitation Supervisor / Inspector or to the GP President. The residents may also call up the GP President and inform complaints, if any.

10. Similarly, the sanitation workers shall also keep note of residents (House number) who do not cooperate and report to the VWSC or to the GP President for necessary action.

Bigger GPs can also make plans to convert the waste collected from residents, after secondary segregation, into gas (gasification / bio-methanation) that can be used at the local school / ICDS kitchen etc. Therefore, if an SWM plan got executed properly and became sustainable, the residents can really set an example to many GPs in the neighbourhood on how to handle household waste intelligibly. We earnestly seek your cooperation, and support.

Task Description for SWM Workers

1. The sanitation workers shall collect waste primarily segregated at the household level.

2. After reaching the **Segregation Shed**, the sanitation workers feed into the **incinerator** (combustion chamber) all the diapers, sanitary napkins and such items handed by households wrapped in old newspapers. This is about the RED bin.

3. Then they turn to handle wet waste: They shall do secondary segregation of the wet waste. During secondary segregation, their main job is ensuring that wet waste do not have any mix up of other types of wastes.

4. Before the wet waste goes into composting or into a gasification plant, the workers shall do the necessary chopping, crushing (using the crushing / chopping tool installed at the segregation shed) so as to make it fit for faster composting / easy gasification. This is the technical arrangement for treating wet waste. This is about the GREEN bin.

5. The workers then do segregation (tertiary segregation) of dry wastes. The main task here is sorting various materials like plastics, bottles, papers, card boards, cosmetic containers, tins separately. This classification results in grouping items that can be sold for scrap dealers (that means what goes for recycling to recyclers), and those items that must be sent to designated landfill area. This will include other hazardous wastes, if any.

6. The items picked from the dry waste for sale to recyclers shall be kept in a store. This will be part of Segregation Shed. Incinerator will also be part of the Segregation Shed.

7. Periodically, it will also be a responsibility of the sanitation workers to take out the manure from compost yard / gas plant, and keep them in sacks.

Task Description for SWM Supervisor / Inspector

1. Educate and train the workers on collection, and segregation.
2. Supply uniform, green caps, and other protective gearings to the workers
3. Introduce to the sanitation workers how to use the incinerator; how to use the segregation shed; how to use the chopper / crusher tools; how to use the gasification plant, if available.
4. Make periodical plans assigning workers for various tasks in waste management.
5. Make sure that the waste transported by trucks / trailers from one place to another is 'covered properly and transported'.
6. Oversee and educate workers on waste segregation until they become familiar with segregation methods. Arrange for exposure, if required.
7. Arrange segregation and sale of recyclable wastes.
8. Identify a suitable place to be used as landfill, and prepare – beware of dumping being called as landfill.
9. Oversee the type and form of waste fed into the composting / gasification plant, that the garbage are of acceptable type and in acceptable form.
10. Oversee the waste that come from markets and restaurants are in acceptable form before they are fed into the composting / gasification plant / incinerator.
11. Oversee the use of incinerator – how it is used, and what goes in there?
12. Make sure that no dumping takes place anywhere in the GP by any sanitation worker or by residents. Nub such practices in bud, while the SWM project is on the runway.
13. Attend to the complaints brought about by the Sanitation Workers promptly.
14. Ensure the workers get their wages on time, and recommend for incentives from the sale of recyclable items.
15. Ensure the health of the workers through periodical health check-up, and if they use their protective gearings while at work.
16. The sanitation workers should not work overtime, nor should they be allowed to laze around. Calculate and deploy the right number of workers, and they should get one-day weekly off on rotation basis. Along with their monthly wages, they should be supplied toilette - two detergent soaps, and two bath soaps.
17. They should associate their work with cleanliness and as part of preventive health. Their perception of their work should be that they are managing waste scientifically, which is an extremely serious problem world over; and that in the process, they are converting waste into recyclable products, energy, and usable manure, which is a wonderful thing. They should not feel small about what they are doing; and no one should be allowed to look down upon them.

Chapter – 2

A Model Bylaw for Solid Waste Management in Gram Panchayats

Bylaw for ……..Gram Panchayat…….Panchayat Union of …….district.
Approved by Gram Sabha on……/……/…..2016

PART – I

General

1. The jurisdiction of the bylaw is limited to solid waste management of the villages and hamlets within …….. Village Panchayat.
2. These bylaws are prepared keeping in view the Constitution of India (Articles 243G, 243H, 243I, and 280) and the Guidelines of the Swachh Bharat Mission (G) for solid waste management in rural areas.
3. The Village Water and Sanitation Committee (VWSC) is hereby appointed Executive Authority to plan, collect, treat and dispose kitchen wastes, and other domestic waste generated by households, shops and other establishments within the boundaries of the Panchayat.
4. The VWSC shall put in place a proper system for solid waste management for this GP. It shall fix terms and rates under which wastes generated by residents shall be collected and disposed in a manner that is healthy, and overall cleanliness of the village shall be maintained.
5. Solid waste generated by households, shops and establishments, and marriage halls within the GP shall be handled by a team of sanitation workers trained and appointed by the VWSC with the approval of the GP on terms set out in this bylaw (and related rules to be intimated when required).
6. Differential rates will be applicable to different category of residents such as households, tea stalls, village restaurants and eateries, marriage halls, schools and offices if any, vegetable markets, mutton and chicken stalls, grocery shops etc.
7. The rates set out in this bylaw are hereby imposed on every household and the rates shall be levied and collected in accordance with a tariff fixed (See 2.5).
8. The rates shall be revised once a year to reflect changes in the cost incurred in solid waste management services
9. Revenue collected for providing solid waste management (SWM) services shall be used only for the purpose of operation and maintenance of the said services including the workers' salary, employed additionally (or made to work for extra hours) for this purpose.

10. Any person who behaves in breach of this bylaw shall be liable to a fine as stipulated in this bylaw (See Point No.2.5).

PART – II

1. The GP shall do a survey and sort out residents under different categories (See User Category below). There will be a series of community education programmes conducted with the help of Block level staff of the government (or an NGO) involved in sanitation promotion (SBM) activities.
2. Residents, and shops etc. of the GP shall be intimated which category they fall under for the purpose of payment of service charges for SWM – preferably monthly (or as agreed upon).
3. The unit considered as house for the purpose of House Tax shall be considered as household in this case also.

2.1 User Category

i. Households
ii. Tea stalls
iii. Village restaurants and eateries
iv. Marriage halls
v. Vegetable markets
vi. Mutton and chicken stalls / Fish markets
vii. Grocery shops
viii. Schools and offices, if any
ix. Temples, churches, mosques etc. (unless they have their own waste disposal arrangement)
x. Others

It is at the discretion of the VWSC, that a destitute woman or aged person running a small petty shop with an investment of less than Rs.1000 (one thousand only) may be exempted from paying, provided s/he already pays as a household. This is not applicable to others such as those who run a village eatery, vegetable vending (with the idea of chucking waste on the street corners or into drainages), chicken stall etc.

2.2 Technical Stipulations

1. The Panchayat shall pass a resolution banning the use of use-and-throw carry bags, and use-and-throw tea cups and seek the cooperation of community to carry reusable cloth bags, and insist on shopkeepers to use only biodegradable alternatives, in order to help the buyers who forget to bring cloth bags.
2. Every household shall be provided with two coloured baskets – one for WET WASTE, and the other for DRY WASTE. Households will be educated on which

waste goes into which bin / basket, and the intervals at which collection cart visits them.

3. Primary Segregation shall take place at the source where waste is created (e.g. household level). Secondary segregation shall take place at SWM shed of the GP.
4. The responsibilities each category of SWM service users is provided separately.
5. Special arrangements shall be made for cleanliness during temple festivals and local festivals.

2.3 Inspection

1. Respective ward members of Panchayat along with the members of VWSC (or a supervisor appointed for this purpose) shall pay inspection visits to make sure that the community members, shopkeepers and others keep their surrounding clean.
2. They shall also personally visit in order to educate houses / shops that repeatedly mix up, or do not cooperate as reported by the sanitation workers.

2.4 Non-compliance

3. Where households or some residents are found not abiding by the Panchayat norms, and are chucking waste on the street corners or in some vacant place in residential areas shall be liable to pay penalty as decided by the VWSC.
4. In the event of a resident's persistent non-cooperation, the Panchayat may take the extreme step of cutting off other services like drinking water supply etc.

2.5 Payment for Services

The tariffs set for the SWM services with respect to different users are suggested below. However, the best way to do this is each GP can work out a budget (of likely expenditure to be incurred on SWM, and accordingly work out the service charges [rates] for each category of service users, which should serve as income to be able to meet the expenditures). The following is a suggestive tariffs for different user categories.

1. The service charges for SWM shall be payable to the sanitation worker (or sanitation supervisor) at the door steps of service users before the 5th day of every month, unless otherwise specified. This is easier to collect and easier to pay. A receipt for the amount paid shall be insisted on by the residents who pay.
2. Alternatively, the services charges may be paid at GP Office before the 5th of every month in advance.
3. Payment for SWM service under the terms and conditions laid down in the bylaw if not paid by the party concerned within the time stipulated shall be recoverable in the same manner as house tax.

4. Waste baskets given for SWM purpose shall not be put to any other use, causing SWM to suffer. In such an occurrence the amount spent on the baskets shall be recovered at double the price.
5. Household not wanting to involve themselves in primary segregation can do so, provided they are prepared to pay Rs.80 every month, instead of the regular Rs.30.

Sl.	User Category	Service Charge (monthly)	Remarks
1	Households	Rs.30 /Rs.80	Payable monthly (Type – A) (If a household does not want to spend time on primary segregation, they can opt to do so on additional payment of Rs.50 every month. They shall be known as Type –B.
2	Tea stalls	Rs.40	Payable monthly
3	Village restaurants and eateries	Rs.60	Payable monthly
4	Marriage halls	Rs.500	Payable after every marriage
5	Vegetable markets	Rs.30	Payable monthly
6	Mutton & chicken stalls / Fish markets	Rs.60	Payable weekly
7	Grocery shops	Rs.40	Payable monthly
8	Schools and offices, if any		Payable monthly
9	Temples, churches, mosques etc. (unless they have their own waste disposal arrangement)		Collected from the community along with the collection made for temple festivals / local festivals.
10	Others (such as dispensaries)		

2.6 Penalty

1. Anyone willfully or negligently throw waste on the street shall be considered to have violated and shall be punished with a fine of Rs.500 in the case of households and shops; and Rs.2000 in the case of marriage hall or as decided by the VWSC.

2. The VWSC may also decide differential penalties in the case of one time violation, and repeated non-compliance / negligence.

3.1 Responsibilities of Households

The following are responsibilities of households and others except marriage halls.

1. Each household shall segregate waste into wet waste (kitchen waste) and dry waste (other waste) and put in the bin given specifically for each purpose. This is

called primary segregation, which shall take place at the household level. Those who do not want to do it can do so on extra payment as prescribed by the GP. Those who repeatedly give mixed up (both dry waste and wet waste) shall be automatically classified under Type – B and charged accordingly.

2. As far as possible leftover food items such as fish bones, mutton and chicken bones may be given to cats / dogs, if available at the households. This is a way to deal especially with leftover food at household level. Otherwise, they may be wrapped in a newspaper and handed to the sanitation workers (preferably with a green X [cross mark] on it). It helps easy identification of what is inside.

3. Vegetables peels, fruit peels, egg shells, used tea leaves, leftover cooked vegetables on the plat may be put in wet waste bin. But never knot it.

4. It is always good to wash inside of a milk pocket with water. That way, the milk in frozen form may find its way to your milk pan. Washed milk cover renders it easy for the sanitation workers to deal with it, as it does not smell. Moreover, just in case an unwashed milk cover ends up on the street, it happens that calves [small ones of a cow] tend to eat up the cover because of the milk smell, which over the years becomes dangerous for the animal.

5. Certain items such as sanitary pads, children's nappies, and condemns shall be wrapped in newspapers, or some papers available (put a red X [cross mark]) before it is handed to the sanitation workers, who shall take them to bury in landfill. Marking helps easy identification so that the sanitation worker shall not open it.

6. Putting used sanitary pads in plastic carry bags and knotting it should be avoided. They should always be wrapped in newspapers or some paper available.

7. Similarly, putting kitchen waste (vegetable peels etc.) in carry bags and knotting it should be avoided.

8. The sanitation workers (in uniform & cap) shall visit every household with a cart / tri-cycle, and blow a whistle to let the households / shops in that area to get to know that the waste collection vehicle has arrived. It is the responsibility of each household to give the two baskets to the sanitation workers, who shall empty each basket in separate containers they bring / in partitioned vehicles.

9. The complaints, if any, from the residents may be written in the complaints book available in the waste collection vehicle. The residents may also call up the mobile number available in the cash receipt that they received the previous month.

10. Similarly, the sanitation workers shall also keep note of households / shopkeepers who do not cooperate (not abide by the bylaw) and report to the VWSC.

3.2 Responsibilities of Sanitation Workers

1. The sanitation workers shall collect waste primarily segregated at the household level, and after reaching the segregation shed allotted, shall involve in secondary segregation, where they segregate (different types of) recyclable items from the items that must go for composting etc.

2. The sanitation workers shall collect service charges from households and give account to the Panchayat Secretary to keep accounts, and follow up those who have not paid.

3.3 Responsibilities of VWSC / Gram Panchayat

1. Arrange for composting of wet waste (type of composting as determined early on).
2. Arrange segregation and sale of recyclable wastes and sale of the same.
3. Make sure hardly 10 – 15% ends up in a sanitary landfill. And it should not be considered as a place for dumping.
4. Make sure the village streets, street corners, and vacant places are clean. And everyone cooperates to maintain cleanliness. Frequently inspect vulnerable spots.
5. Collect service charges regularly and spend the amount as pre-determined.
6. Promptly attend to community grievances so that their cooperation can be counted on.
7. Sustain the work, and make it a regular habit among the residents not to litter in open places / in drainage canals etc.

Chapter – 3

Preparation of a Detailed Project Report

A detailed plan is essential to have mental dry-run of the project. It helps to estimate the (i) manpower, (ii) equipment, (iii) technological, and (iv) financial requirements. An outline of a DPR (Detailed Project Report) is presented below. This can help GPs to prepare a plan of their own.

- Name of the GP……..Block:……..District……...
- Population:
- Households:
- Number of Wards or Streets or Hamlet: (provide anyone)
- Ward-wise/street-wise Households / habitation: (use the following format to present the data)

Sl.	Name of the Habitation / Hamlet	No. of Households	Approx. Volume of solid waste generated
1			
2			
3			

- What is the present status / arrangement for waste management?

PROPOSAL

- Describe what is proposed (provide a diagram how you are planning to manage waste?
- What facilities are required? Land, Infrastructure etc.
- What equipments are required? Justification for each equipment (e.g. Tri-cycle)
- How do you plan to prepare the community / Households?
- How do you plan to equip the GP (Institution) to take up this new task (SWM)
- Mechanism of Operation (Technical Plan)
    - Additional Manpower Requirement
    - Collection Arrangement,
    - Transport
    - Treatment
    - Disposal

- Financial Plan
    - Fixed (One-time) Investment Requirement (List the requirements with budget)
    - How much does the monthly Operation Expenditure comes to
- **Budget**

Sl.	Items of Expenditure (monthly)	Rs.	Items of Income (Monthly	Rs.
1				
2				
3				
4				

What is the Financial Assistance Requested?

Other Requirements:

A Note on the Land where the facilities are to be set up (supporting papers):

What is the plan for sustainable Operation & Maintenance of the Project ?

Annexure – 1

Solid Waste Management System in Mudichur Gram Panchayat

Kancheepuram District, Tamil Nadu

Mudichur Village Panchayat in Kancheepuram district, Tamil Nadu implements an SWM model. It is functional for more than seven years now. What makes Mudichur click, while in many other Panchayats, such models fade away after a brief stint? And what lessons Mudichur can give for replicability in other parts of the country? Mudichur being very close to Chennai, the influence of city culture of keeping one's house clean, and remaining unconcerned of the filth on the street in front was common. *Litter any where irresponsibly and accuse the neighbours of their irresponsibility was the culture. A* series of massive campaigns run by the State government to stop open defecation, made the Panchayat functionaries to work towards making the Panchayat open defecation free (ODF). In order to achieve the status of clean village, the GP president took leadership to put in place SWM plan.

The lesson from Mudichur on SWM is that there is no dearth of technologies. What is required is a functional management system (model), which in Mudichur they have developed one. Mudichur Panchayat took Hand-in-Hand and the DRDA into partnership to create a solid waste management system. They are implementing it meticulously that it has become regular, making us call it 'a system'. The Panchayat President, Mudichur with the help of a team of youth (and appointed Green Friends) is managing household waste admirably. Certainly, the role of Hand-in-Hand (NGO) in making this system functional deserves to be appreciated as well. Mudichur model has several ideas and precautions for any Panchayat that wants to replicate.

In replication, the following points deserve to be emphatic.

- **Systemic Thinking:** Measures to be taken in advance to avert possible failures and to secure good results are an imperative in a solid waste management project. The normal way of thinking about solid waste management are place dustbins at certain distance, and forget about it (Failure Model - 1). It overflows and takes a run-off extending the area under garbage; Collect, transport and dispose – dispose

irresponsibly at the outskirts (Failure Model - 2). On the contrary, in Mudichur, they have created a system taking into account the logistic aspects, technological aspects, financial aspects, and they have roped in the support of external support agencies where required. This systemic thinking makes the difference, and this has made Mudichur Panchayat President stand tall amid a crowd.

- **System Sustainability:** The experience of Mudichur puts it fairly clearly that finding the sources of income for meeting out the 'operational expenses' (day-to-day running expenses) month after month, determines the real system sustainability. Without a clear-cut idea of sources of income to meet the operational expenses, investing in non-recurrent expenses such as dustbins and tri-cycles do not augur well. Such a case shall help write only a failure story very soon. This is a caution, one should make note of.
- **Social Enterprise Model:** In order to meet out the expenditure involved in managing the solid waste management system, the source of income from user fees collected plus sale of compost etc. were found to be insufficient. This did not deter them. They have thought out of the box to come up with sensible solution, instead of being on the same sludge grumbling about the impossibility. The excess income earned out of RO Plant through sale of drinking water to the households is used to make up the loss incurred in running the solid waste management system for the same community. It is win-win in terms of both drinking water supply and environmental sanitation in a given community.
- **Community Preparation:** The GP with the help of Hand-in-Hand (NGO) has spent sufficient time preparing and educating the community to adhere to and cooperate in the interest of everyone.

(Complete case study of SWM at Mudhichur is available at NIRDPR wesbite)

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Annexure – 2

Solid Resource Management in Kurudampalayam Panchayat, Tamil Nadu:
A Classic Case that Transforms Waste into Resource

Kurudampalayam Gram Panchayat is located very close to Coimbatore city in Tamil Nadu. It has 14 wards, with a population of 33,000 that make into 11,360 households. There are marriage halls, restaurants, shops, schools and so on. The amount of daily waste generated is not less than 800 kgs per day. The practice that existed before the introduction of solid resource management system in Kurudampalayam was 'discarding domestic refuse in street corners, and in the open drains'. For the past 3 years, this GP has started viewing waste as a resource, and it recovers usable resources from waste. Therefore, Kurudampalayam GP forbids the usage: 'solid waste management', and replaces it with 'solid resource management'. The Solid and Liquid Resource Management (SLRM) Unit at Kurudampalayam, as it is locally known, has a lot to offer to other Gram Panchayats desirous of drawing ideas for managing solid wastes from households, institutions (schools), restaurants, and marriage halls in rural areas.

The basic approach to solid waste management in Kurudampalayam is that there is almost nothing that can be called 'waste'. This is based on the premise *that any waste can be converted into resource that can provide utilitarian value / as a useful commodity*. It might require changing the form through certain amount of processing, and presentation of the same, in a manner acceptable in the market. Any waste can be converted into a socially useful commodity. Hence, the usage 'Solid Resource Management' in Kurudampalayam and not 'Solid Waste Management' as it is addressed in most other places we have come across. Precisely, it is not about solid waste management in the minimalist sense; rather it is about scientific management of solid waste in its entirety. Besides this, tertiary (third level) segregation is something unique at Kurudampalayam which is done with the idea of recovering every usable resource from the waste collected.

The resource recovery chain is really long and tedious. The Unit is running since October 2013.

Kurudampalayam SLRM Unit is a must visit for Panchayat Presidents to get exposed to, on how to handle various types of wastes generated in rural areas. There are several good practices like solar battery operated tri-wheelers used for collecting wastes from households and restaurants; destitute women trained and deployed in waste collection, and segregation. The painstaking third level segregation that sort wastes of various recyclables in separate compartments are good practices to learn. It has all the potentials to emerge even as Training cum Demonstration Centre for Solid Waste Management in Tamil Nadu.

(Complete case study of SWM at Kurudampalayam is available at NIRDPR website)

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Annexure – 3

What to include in a Waste Survey?

i. Source of waste (Households, restaurants, marketplaces, streets etc.)
ii. Types of waste generated
iii. Amount of waste generated type-wise (Wet / Dry and Hazardous etc.)
iv. Identify vulnerable spots/ infamous spots – dumping sites
v. Existing disposal practice – at household level, and at marketplaces
vi. How do institutions like schools, ICDS, local clinics dispose waste?
vii. What is the capacity of the GP to implement an SWM plan
viii. What does it take to build the capacity of the GP to manage an SWM unit?

Annexure - 4

Report from Waste Survey

Break-up details of Waste Generated in ..... Gram Panchayat

S.no	Name of the area	Waste generated per day in .....GP				Total (kgs)
		Wet waste (kgs)	Dry waste (kgs)	Hazardous waste (kgs)	Road sweeping waste (kgs)	
1	Ward - 1					
2	Ward - 2					
3	Ward – n					
4	Main Streets					
5	Market area					
6	School / ICDS					
7	Ration shop					
8	Temple / church / mosque area					
9	Tea stalls / Restaurants					
10	Marriage halls, if					
Total						

- Total Waste Generated per day
- Average amount of waste by each household
- Average amount of waste generated by other residents / shops & establishments / shandy
- Understand the existing waste disposal system
- Identify vulnerable / infamous spots
- Nature of the community (in response to previous efforts of similar nature)
- What kind of a plan is required at the GP level to take up SWM project
- Who should we involve in terms of support institutions, and implementation partners?

Annexure - 5

Technical Management / Execution

The following are the stages involved. We present below how we intend to technically manage each stage of the SWM process. The technologies and tools proposed to be used are presented as well.

Stage	Technology / Technique	Tools	Remarks
Stage - 1 COLLECTION			
1.1 From Households	Green Friends with collection vehicles shall collect as per the area assigned by the Sanitation Inspector	Three bins for every house	
1.2 From Shops		Three bins	
1.3 From Market area		Three bins	
1.4 From Ration shops		Two bins	
1.5 From Tea stalls		Two bins	
1.6 From Restaurants		Two bins	
1.7 From Bus stop area		Two bins	
1.8 From Health Centre / clinic		Three bins (internal management will be Health Centre's)	
1.9 From School / ICDS		Three bins (internal management will be school's)	
1.10 From Marriage halls		Two	
Stage – 2 SECODARY SEGREGATION	**Wet Waste Management:** This is especially to ensure that **wet waste** that will go for vermi-composting or into the gasification plants does not have anything harmful / mix up of plastics etc.	Pick anything that is not supposed to go into vermi-composting and put them in an aluminum vessels given (for sending to landfill).	
Stage – 3 TREATMENT OF WET WASTE	**Wet Waste Management:** After ensuring that wet waste does not have any mix up, they are shredded / crushed as it may require, and fed into the gasification plant / vermin-composting bed.		
Stage – 4 TERITIARY SEGREGATION	**Dry Waste Management:** This is to sift /sort materials that are **recyclables** and that which must go to landfill.	Pick items (such as bottles, pet bottles, plastics, milk/oil covers, bottle caps etc.) that are saleable / recyclable.	
Stage – 5 TREATMENT OF DRY WASTE	Dry waste recyclable / saleable are kept in stores for sale to scrap dealers periodically, as decided.		
Stage – 6 TREATMENT OF HAZARDOUS WASTE	• Hazardous wastes such as children's diapers, sanitary napkins, medical bandage, band		

	aid and such items go into incinerator. • Other items such as old batteries, blades, fused bulbs/ tubes, broken ceramic items, rusted tins etc. go to landfill.		

Useful Materials / References

Technological Options for Solid and Liquid Waste Management in Rural Areas, Ministry of Drinking Water and Sanitation, SBM (G), GoI, New Delhi, April 2015. This is a useful handbook to get to know especially the technologies available for SLWM in rural areas.

Solid and Liquid Waste Management in Rural Areas – A Technical Note. UNICEF and GoI, Ministry of Rural Development, Department of Drinking Water Supply. 2007. This is also a good guide on technologies available for handling solid waste and wastewater in rural areas.

Waste : An Approach Paper for Sustainable Management of Waste, Suchitwa Mission, Local Self Government Department, Government of Kerala (written by: Dr K Vasuki IAS). This is a good source to be able to emphasise that solid waste management is a medical emergency, and to get guidance on the 3 Rs (Reduce, Reuse, Recycle) approach.

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