

Scaling up Solid and Liquid Waste Management in Rural Areas



About this Handbook

Rationale

When the Government of India launched its Total Sanitation Campaign (TSC) in 1999, only around one in five rural households used a toilet. Hence, the focus was on prompting behavior change to eliminate open defecation and encouraging usage of toilets as this was seen as the highest priority. Subsequently, as sanitation coverage has scaled up and the number of open defecation free (ODF) villages has increased, the focus of the TSC has widened to include issues such as waste management in rural areas. While technology options for waste management are well known, the programmatic aspects of implementing a waste management program in rural areas are not as well understood.

This handbook seeks to address this gap by focusing on the planning, institutional, community mobilization and financial dimensions of implementing a waste management program in rural areas.

Target Audience

The handbook has been prepared for program managers and implementers working in rural sanitation at district and sub-district levels to strengthen their understanding on how to implement a waste management program at scale in rural areas.

Overview

The handbook is divided into seven sections:

1. **Understanding Waste:** provides a basic understanding of common terms used in waste management.
2. **Waste Management in Rural Areas:** provides an overview of issues related to waste management and how this fits into the program framework of TSC and Nirmal Gram Puraskar (NGP).
3. **Approach to Planning:** addresses the goal of waste management in rural areas, units of planning, importance of phasing and criteria that can be used to select pilot Gram Panchayats (GPs).
4. **Institutional Options:** provides guidance on institutional arrangements for planning and implementing a waste management program in rural areas.
5. **Community Mobilization:** focuses on scaling up a participatory approach to waste management.
6. **Technology Options:** outlines the principles that can be adopted while selecting an option.
7. **Financing, Incentives and Monitoring:** addresses sources of funding for capital and operational costs, and looks into how a solid and liquid waste management program can be monitored at district and GP levels.

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Abbreviations and Acronyms

CBO	community based organization
CLTS	Community Led Total Sanitation
CSR	Corporate Social Responsibility
GP	Gram Panchayat
IEC	Information, Education, Communication
kg	kilogram
NGO	nongovernment organization
NGP	Nirmal Gram Puraskar
O&M	operation and maintenance
ODF	open defecation free
PRI	Panchayati Raj Institution
PSG	Program Support Group
PVC	polyvinyl chloride
RMLP	Ramakrishna Mission Lokshiksha Parishad
SEUF	Socio Economic Unit Foundation
SGBGSA	Sant Gadge Baba Gram Swachata Abhiyan
SHG	Self Help Group
SLWM	solid and liquid waste management
TSC	Total Sanitation Campaign

Acknowledgements/Credits

Acknowledgments: All questions included in this publication are drawn from a series of policy discussions and interactions with governments at national, state and local level and rural sanitation practitioners in India. The handbook was developed through an iterative process wherein questions were first prioritized to identify the most relevant ones for inclusion and responses reviewed by experts to ensure quality while retaining a user-friendly style of writing. Cartoons were commissioned to illustrate the key themes in rural waste management and ideas for the cartoons emerged from a creative brainstorming process with contributions from (in alphabetical order) Aravinda Satyavada, C Ajith Kumar, Gianluca Guidotti, Kakumanu Arokiam, Mariappa Kullappa, Manu Prakash, Mathews Mullackal, Rama Rohini Sarvepalli, Sanchita Ghosh, Snehal Shah, Suseel Samuel, Vandana Mehra and Upneet Singh. Cartoon development, production and design was coordinated by Vandana Mehra, Regional Communications Specialist. The team would like to acknowledge the guidance and support provided by Christopher Juan Costain, Regional Team Leader, WSP South Asia.

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Cartoons: Mr. Sudhir Dar is one of India's most eminent cartoonists and lives in New Delhi. He has delighted millions of readers for almost four decades with a pocket cartoon called 'This is it!'. Mr. Dar is a winner of several national and international awards and has featured in *The New York Times*, *The Washington Post* and several other prestigious publications worldwide. *MAD* magazine called him a 'Tasty Indian Nut'. He was born at Allahabad in 1932 in a family immersed in India's freedom movement. An M.A. in Geography, he began his career in broadcasting and then switched to Air-India. He came to cartooning in 1960, creating a witty, wordless cartoon series for *The Statesman* of Delhi and Calcutta. In 1967, he joined *The Hindustan Times* where he was for 22 years drawing political cartoons and a light-hearted series called "This Is It" that appeared on Page One. He was then with *The Pioneer* of Delhi, Lucknow and Mumbai. He then turned into a freelance cartoonist and in the last decade he has done prestigious assignments for varied agencies like the Water and Sanitation Program (World Bank), United Nations Development Programme, Microsoft, Indian Ministries of Tourism and External Affairs, etc.

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FOREWORD

Total Sanitation Campaign (TSC) launched by Government of India has been the cornerstone of a decentralized, incentive based approach to achieve rural sanitation objectives. The scheme has developed strategic components to ensure coverage of sanitation facilities through financial and programmatic support for households, and for institutional and community sanitation.

Construction of toilets needs to be complemented with mechanisms of waste handling to ensure a safe & hygienic environment in the rural areas. Safe disposal of solid and liquid waste is a major step on the sanitation ladder where communities have begun to successfully tackle. Government at present has specific provision for solid and liquid waste management (SLWM) as an important component under TSC.

The Ministry of Drinking Water and Sanitation has been continuously updating technical notes on rural sanitation to reinforce the quality of interventions. The Hand Book on **Scaling up Solid and Liquid Waste Management in Rural Areas** gives a very useful insight on the planning, construction, operation and maintenance of SLWM units in a sustainable way. The effort has been to make a comprehensive document that is user friendly for planning and executing agencies.

This compilation is the result of excellent team work and synergy of contributions from different sectors and institutions, ably assisted by Water and Sanitation Programme (WSP) of World Bank. I wish to place on record my deep appreciation of this effort and hope that TSC programme managers, district implementers and stakeholders will find this book immensely helpful in understanding mechanisms to implement waste management programmes at scale.

(Vilasini Ramachandran)

Place: New Delhi
Dated: 16th April, 2012



KEEP YOUR VILLAGE CLEAN

I CAN'T EAT UNLESS MY HOUSE IS SHINING!!

SLIP

WELCOME

Sudhakar
April 2012

Understanding Waste

What is waste?

Waste can be defined as:

- Any material/liquid that is left over after productive use or which is beyond any use in its current form and is generally discarded as unwanted; and
- Material linked to human activity in comparison to nature which has its own system of recycling waste such that it eventually becomes a resource: for example, organic matter such as leaves, branches, and so on, decompose to form manure.

Why is safe disposal of waste important?

Safe disposal of waste can lead to:

- **Health benefits** from safe disposal of waste that would otherwise contaminate the environment;
- **Economic benefits** through reuse/recycling of products that would have been discarded as waste; and
- **Aesthetic benefits** from a clean environment without unsightly rotting waste dumped in the open.

How can waste be classified?

Waste can be classified in different ways:

- Based on its **physical properties**, waste can be categorized into solid waste (for example, garbage) and liquid waste (for example, waste water) (Figure 1);
- Based on **pattern of use**, it can be classified into human waste (feces, urine), animal waste, farm waste and industrial as well as commercial waste; and
- Based on **source**, waste can be categorized as municipal waste (for example, household waste, commercial waste, and demolition waste), hazardous or toxic waste (for example, radioactive waste, explosives waste and e-waste), and biomedical waste (for example, hospital waste).

Box 1: Waste or Resource?

While one way of looking at waste is to treat it as useless material, another viewpoint is that it can be converted into a different form which can then be productively used. The latter view treats waste as a resource. The three 'R's of waste management – **Reduce, Reuse, Recycle** – emanate from this point of view. As waste management can be logistically difficult and expensive, it is advisable to manage the 'waste' after all three R options have been considered.

What is solid waste?

Any waste other than human excreta, urine and wastewater is called solid waste (Figure 1). Solid waste can be classified into two types: biodegradable and nonbiodegradable.

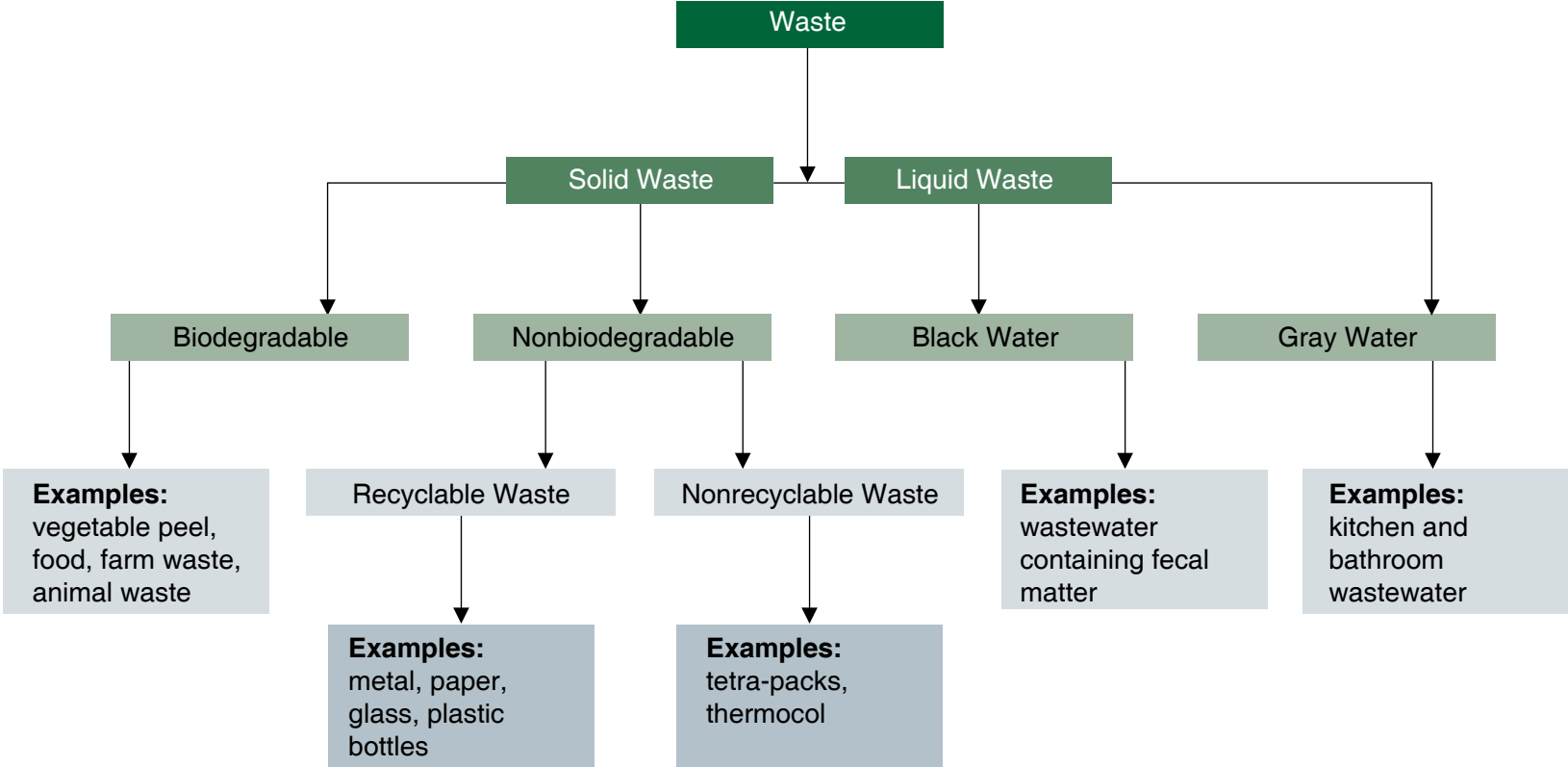
- **Biodegradable waste** is that which can be decomposed by biological processes, for example, vegetable peel, food, farm waste, and so on. Organic waste is biodegradable and can be recycled; and
- **Nonbiodegradable waste** cannot be broken down by biological processes, for example, paper, glass, metal, and so on. Nonbiodegradable waste can be further classified into two types: recyclable and nonrecyclable
 - **Recyclable waste** is that waste which has economic value that can be recovered, for example, metal, paper, glass, plastic bottle, and so on
 - **Nonrecyclable waste** is that waste which does not have economic value of recovery, for example, tetra packs, thermocol, and so on.

What is liquid waste?

Liquid waste is water which has been used once and is no longer fit for human consumption or other uses where clean water is required. Broadly, there are two types of liquid waste or wastewater (Figure 1):

- Black water is wastewater from toilets containing fecal matter; and
- Gray water or sullage is wastewater from bathrooms or kitchens. Gray water generally contains fewer pathogens than black water.

Figure 1: Types of waste



HERE'S ANOTHER ONE —
FANTASTIC!! PERFECT
FOR RURAL INDIA!!
'RUBBISH TO RUPEES'..

**IN
MINUTES!!**

ROCKET
FUEL??!

WHAT'S
WRONG
WITH
**GOBAR
GAS??!**

WIND
TURBINES?!



Sudhakar
Dax - April '12

Waste Management in Rural Areas

What are the key issues of solid and liquid waste management (SLWM) in rural areas? Are they different from those in urban areas?

The key issues of SLWM in rural areas, and differences compared with urban areas are:

- **Increasing quantity of waste generation:** The quantity of waste generated is increasing in rural areas as a result of increased population, consumerism and commercial activities. It is estimated that 15,000 to 18,000 million liters of gray water and 0.3 to 0.4 million metric ton of solid waste are generated each day in rural areas (DDWS-UNICEF, 2008). Although the quantity of waste generated in rural areas is increasing, it is still relatively low compared with urban areas;
- **Rural/urban situation:** Given the smaller size and relatively stronger community links in rural settings, initiatives for SLWM may be relatively easier to implement in rural areas compared with urban areas; and
- **Options for waste disposal:** In rural areas, compared to urban ones, land availability is not often a constraint. Also, there are more options possible in rural areas for reuse of waste, such as composting of biodegradable material, which can be used in kitchen gardens, agricultural fields, and so on.

It is often said that waste can be wealth if it is managed properly. Is this true?

Yes, solid and liquid waste, if managed properly, can be a resource to generate income and livelihood. However, the cost of processing the waste to recover its value must be kept in mind when computing the benefits. Some examples of reuse of waste include:

- Compost from animal, farm and kitchen waste can be used as manure or sold;
- Black wastewater/organic solid wastes can be treated to generate biogas;
- Treated wastewater can be used for nondrinking uses such as watering the kitchen garden, in agriculture, and so on;
- Plastics, if collected, segregated and shredded as per norms can be used in road construction; and
- Waste paper, cloth, metal and glass can be recycled.

Why has waste management been included in the Total Sanitation Campaign (TSC)? What are the provisions?

The reasons for including waste management in TSC are:

- When TSC was launched in 1999, nearly 80 percent of households in rural India were practicing open defecation. Therefore, TSC focused on scaling up household and institutional toilets and achieving open defecation free (ODF) status at the Gram Panchayat (GP) level as this was seen as the key priority;
- Subsequently, sanitation coverage and usage have been scaled up and many villages have achieved ODF status. Therefore, the focus of TSC has been widened to include hitherto neglected aspects of total sanitation such as SLWM;
- SLWM was formally included in the TSC Guidelines in 2006. The Government of India has allocated 10 percent of the total TSC budget in a district to cover capital costs of SLWM works; and
- National and state governments have also introduced incentives to address SLWM (see Section 7: *Financing, Incentives and Monitoring* for details).

Box 2: Waste to Wealth

While there may be income opportunities from converting waste to other uses, it should be understood and accepted that the first priority of waste management should be to dispose the waste safely so that the threat to human health is reduced; economic value derived from the waste should be seen as an additional benefit.

What principles should be adopted when designing an approach to SLWM?

A GP-led approach with the complete involvement of the community can be an effective vehicle to tackle the rural waste management problem. A clean environment is a public good and, to achieve this, there must be a demand at a collective level in a community to manage waste safely. This approach is based on the following principles:

- Community participation and ownership, based on a felt need through a participatory process;
- Building capacity at the local level to manage and maintain facilities;
- Promotion of a variety of technologies that are user-friendly and affordable;
- Promotion of effective waste management principles;
- Segregation at source of solid waste (biodegradable and nonbiodegradable) and liquid waste (gray water and black water);

- Household based treatment and management, as a first option, and community-based collection, treatment and disposal systems, as the second option, based on the principle that waste should be treated as close to the source as possible;
- Involvement of community-based groups (for example, youth clubs, self-help groups (SHGs), mahila mandals) in waste management operations;
- Involving recyclers (for example, *kabadiwalas*) as partners;
- Emphasis on adoption of recycling/reuse options;
- Developing an effective financial model to address capital and operational costs; and
- Creating incentives for motivation and sustainability.

Box 3: Participatory Approach to Waste Management: Example of East Midnapore, West Bengal

In East Midnapore district, Ramakrishna Mission Lokshiksha Parishad (RMLP) has been supporting the district government in implementing TSC, including waste management initiatives. An important incentive to address waste management is the Nirmal Gram Puraskar (NGP). While the GPs in the district had been relatively successful in achieving ODF status, they lacked capability in waste management and this is one of the key eligibility criteria for winning the NGP.

A participatory process is used with community involvement at every step. The process begins with a one-day orientation workshop on SLWM for Panchayati Raj Institution (PRI) officials, opinion leaders, nongovernmental organizations (NGOs), and so on. Ramakrishna Mission affiliated youth clubs are very active in the villages and are trained at the cluster level on SLWM next. This is followed by awareness raising activities such as distribution of pamphlets, and so on, in the target village on TSC with special emphasis on SLWM. Within a day or two of this, PRI officials, NGO staff, Ramakrishna Mission volunteers and youth club members organize a habitation (called 'Pada' or cluster) level meeting where people are encouraged to ask questions. On the same day, after the meeting, the group conducts a door-to-door campaign motivating people to act. Based on this, a list of potential 'first movers' is identified and targeted in the following days by the volunteers to begin taking up one or the other of the various SLWM components. This then begins to set the ball rolling, with the neighbors slowly joining in.

The hallmarks of the East Midnapore model are: creating awareness before implementation, involving opinion leaders and community members, identifying potential first movers, following up with a well-defined menu of cost and technology options, creating demand-led implementation by allowing people to see the benefits at each stage, and following up on upgradation needs.

Source: WSP Documentation of Best Practices in SLWM.



HEALTH COMMITTEE

WASTE COMMITTEE

WATER COMMITTEE

ROOM 8

ROOM 7

NUTRITION COMMITTEE

SANITATION COMMITTEE

MADAM.. THREE OTHER COMMITTEES ARE URGENTLY CALLING FOR YOU!!

ROOM 3

Sudhakar Das April 2012

Approach to Planning

What should be the overall goal of waste management in rural areas?

The overall goal of waste management in rural areas should be to promote the outcome of a clean and healthy community where all waste is treated and disposed safely.

What should be the unit of planning?

- The unit of planning for SLWM initiatives should be the GP or a cluster of GPs depending upon the quantity and characteristics of waste being generated, resources available, and so on;
- Within a GP, households and institutions should be the first units of implementation; and
- The maximum effort and input should be focused on management of waste at the point where it is generated such as a household, institution or market place. The principle is that waste should be managed as close to the source as possible to save time, cost and labor. Only waste that cannot be managed at the household level should be part of the community waste management process and system.

Should implementation be phased? Why?

The adoption of a phased approach should depend on the unit of implementation:

- **At the village or GP level**, all households should implement waste management at the same time, since scale contributes to efficiency and effectiveness of community-level waste management; and
- **At the block or district level**, it would be strategic to initiate the campaign in phases rather than simultaneously starting in all GPs in a block or district. As a first step, around 10 to 15 percent of GPs in a district can be selected as pilot sites. This will help to ensure that resources are not spread too thin and lessons from the initial pilot can be used to improve the quality of the approach which is then gradually replicated to cover all GPs in a block or district.

Box 4: Dhamner's Initiative on SLWM

Dhamner Gram Panchayat in Satara district was among the first in Maharashtra to win the NGP and has also won state level awards under the Sant Gadge Baba Gram Swachata Abhiyan (SGBGSA). It is remarkable that this Panchayat has not only achieved ODF status but has also been running a waste management program for more than seven years. This has been possible because of careful planning by the GP and the involvement of the community.

The effort to manage wastewater started when the GP received funds from the government for road construction around seven years ago. The community, under the leadership of the Sarpanch, decided that drains along the roads needed to become functional and it was agreed that:

- No more digging should be done for any reason once the roads were laid – each household was made

responsible for drawing a water pipe from the house to the road, which could then be connected to the water system of the village;

- Each house was responsible for connecting its black water source to the village sewer system; and
- In some houses, gray water from kitchens was diverted to the vegetable gardens.

To address solid waste, the GP provided one *kuchrakundi* (dustbin) for every five to 15 households and community *kuchrakundis* were placed at appropriate locations. The GP recruited two *safaikaramcharis* to collect waste from the *kuchrakundis* and transport it to a common treatment site. Here, waste is segregated and biodegradable waste is composted and nonbiodegradable waste recycled.

Source: WSP Documentation of Best Practices in SLWM.

What criteria should be used to select the pilot GP?

When selecting pilot GPs, focus should be placed on those that have shown interest and had some success in achieving TSC goals related to human waste management by achieving ODF status (Box 5). Among ODF GPs, further criteria that can be used for selection of pilot GPs for a waste management initiative are:

- Population in terms of the number of households and density;
- Quantity of waste generated;
- Location that may influence waste generation characteristics, for example, tourist spot, pilgrimage site, peri-urban area, and so on; and
- Willingness to be involved in the pilot.

In a district, should pilot GPs be selected in the same block?

It would be advisable to select pilot GPs in such a way that they are spread across different blocks in a district. This is recommended for two reasons:

- Firstly, if all pilot or Phase 1 GPs are from a single block, it tends to become an isolated pocket and may not get administrative attention from higher levels; and
- Secondly, selecting pilot GPs across different blocks provides an opportunity to test the participatory approach to waste management under different conditions which is better from the point of view of gradually replicating an approach across all GPs in a district.

Box 5: When is a Village Considered ODF?

A village is considered ODF only when safe disposal of human fecal matter is ensured at all times. This means that even if every household in a village has a toilet, the village would not be ODF if community members continue to defecate in the open or if toilets are only used when convenient, for example, in the rainy season.



BUT
I
CAN'T
READ!!

I.E.C

Sudhakar
Dax
April 2012

Institutional Structure

What is the institutional structure for waste management in rural areas?

Since SLWM is a component of TSC, the institutional structure that is in place for TSC is also responsible for SLWM. This institutional structure is shown in Figure 2. However, since this is a relatively new component, efforts will be required to build the capacity of stakeholders at the state and district levels to facilitate the GP in implementing a safe waste management program.

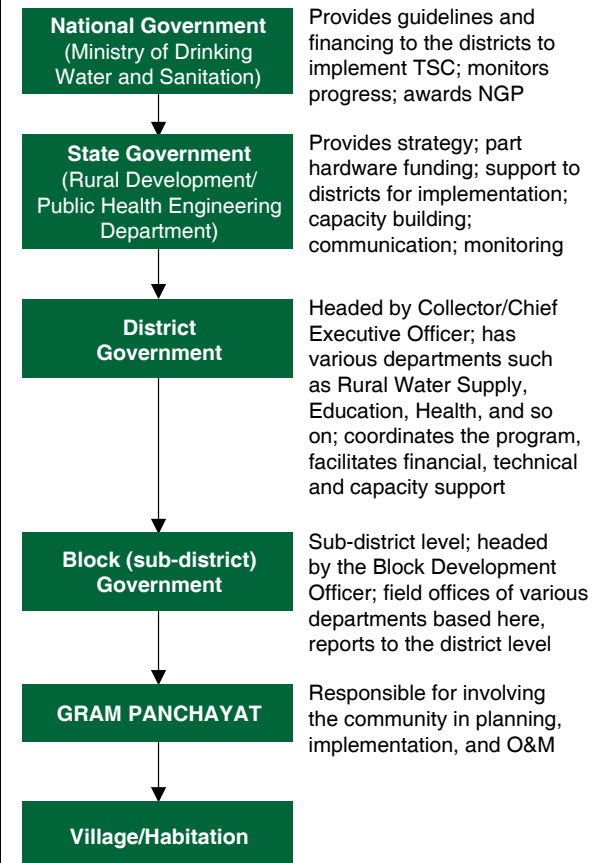
Who should assume overall responsibility for ensuring safe management of waste in rural areas?

At the village level, the GP should ideally have the overall responsibility for ensuring safe management of waste. It should hold individual households and institutions in the village responsible for the management of their waste, through household, institutional or community waste management facilities. Only waste that cannot be managed at source should be managed by the community level waste management system.

What are the various options for construction, and operation and maintenance (O&M) of waste management facilities?

The GP, and households and institutions within it, should be responsible for the construction of SLWM facilities at village, household and institution levels, respectively. A GP can either assume responsibility for O&M or engage another agency for all or part of this activity. GP-led O&M can include hiring workers and buying vehicles for collection and transportation of waste. Alternatively, a community based organization (CBO) (for example, youth club, and women's group), NGO or private operator may be engaged by a GP to undertake O&M.

Figure 2: Institutional structure for solid and liquid waste management





WRONG DAY, MADAM..
THEY'RE ALL
WATCHING
'KAUN BANEGA
CROREPATI'!!!

COMMUNITY
AWARENESS
CAMPAIGN

Sudhakar
April 2012

Community Mobilization

Why do conventional Information, Education, Communication (IEC) programs fail to convince people to adopt safe waste management practices?

The conventional IEC approach has not been found effective in mobilizing communities to take action on sanitation or waste management issues. Some reasons include:

- Conventional IEC assumes that if people are better educated or informed, they will change their behavior;
- Messages are determined by external experts who are assumed to 'know better' and, therefore, may not be relevant or practical in the local context, for example, the messages tend to focus on teaching people about the health risks and diseases linked to poor waste management rather than focusing on people's priorities such as the inconvenience caused by choked drains or smelly garbage dumps;
- Methods used to communicate 'tell people what to do' and people do not get an opportunity to relate to their own concerns or experiences; and
- Conventional IEC tends to have either a very wide focus, for example, promote a wide range of behaviors from waste management to personal hygiene. Alternatively, these can sometimes be focused exclusively on one type of technology without addressing related health risks.

Why use participatory methods to mobilize communities?

Some of the reasons for using a participatory approach include:

- Participatory methods are based on principles of adult education and have been field-tested extensively. Participatory tools help to encourage everyone to participate and, if facilitated well, can be more interesting than a lecture or discussion;
- From the program implementer's perspective, these tools help to gain insights into current practices and potential triggers for change in a relatively short time compared with, for example, a baseline survey; and
- Field experience has shown that community workers find use of participatory methods far more rewarding. Community workers who have tried participatory methods and found them worthwhile usually do not want to return to their earlier methods.

What is the difference between conventional IEC and a participatory approach to waste management?

The differences between conventional IEC and a participatory approach to waste management are summarized in Table 1.

What participatory tools can be used to create practical understanding at the community level?

- While many participatory tools are available, it is important to remember that successful facilitation is as much about the behavior of the facilitator as it is about the method used. The key behaviors include flexibility, informality and learning from people instead of lecturing them;
- Some tools used to trigger behavior change using a Community Led Total Sanitation (CLTS) approach can be adapted to waste management as well such as those listed in Table 2;
- Many other participatory tools are available that can be adapted to facilitate communities to take action to change their waste management practices. While there is no prescribed sequence, it is best to start with rapport building and then use any tool which seems to fit the field situation.

Table 1: Differences between conventional IEC and a participatory approach

Conventional IEC	Participatory Approach
Assumes that if people are better educated or informed, they will change their behavior	Seeks to 'find out' what causes people to change their behavior
Has a predetermined set of core messages	Seeks to innovate to establish core messages driven by local factors
Has a predetermined approach of who does what and how	Allows plenty of freedom as to 'who does what' in each particular context

Table 2: Behavior change CLTS tools that can be adapted to waste management

Rapport building	Starting a dialog with the community
Environmental walk	Observatory walk to understand waste management practices, particularly visits to sites of open dumping or choked drains, to understand the reasons underlying these practices
Waste calculation	Estimation of the amount of solid and liquid waste produced helps the community to quantify the magnitude of the waste problem
Calculation of medical expenses	Estimation of the amount spent on treating diseases linked to poor waste management helps the community to understand the hidden cost of inaction

What factors motivate individuals or a community to adopt safe waste management systems?

An extensive study of hygiene and sanitation projects¹ has identified the following factors as being among the key benefits that motivate people to use new facilities or adopt new practices:

1. **Convenience:** Garbage and wastewater problems that people face are usually not related to health risks but a nuisance from filthy surroundings, rats, flies and bad odor. To motivate people to address this situation, it is important to understand the factors or benefits that they would value from a change in the situation rather than those that are important according to health experts or program staff.
2. **Understanding:** Health experts tend to focus on concepts such as germs and transmission routes, and disease prevention. However, health education that aims at understanding builds on local knowledge and uses health-related beliefs and reasoning of the people themselves.
3. **Prestige and Approval:** People tend to adopt practices that are associated with approval from people they respect or help them to gain prestige. A community may also institute rewards for compliance or fines for noncompliance.

However, convenience and understanding are found to be linked to more sustainable adoption than approval or prestige alone.

¹vanWijk, C. and Tineke Murre (undated). *Motivating Better Hygiene Behavior: Importance for Public Health Mechanisms of Change*. IRC International Water and Sanitation Centre.

Box 6: Involving the Community in Waste Management: Example of Chunakkara Panchayat in Alappuzha District, Kerala

Chunakkara Panchayat faced a major problem of waste management with garbage piling up in public places leading to protests by residents. To address this problem, the Panchayat entered a partnership with the Socio Economic Unit Foundation (SEUF), an NGO in the sanitation sector, to promote decentralized waste management through a process of intensive awareness building and community education. A trained resource group called the Program Support Group (PSG) was set up. The expert members interacted with the community, and convinced them about the issues related to waste management. PSG and the GP focused on localities within wards. Each ward was divided into six to seven localities and, from each locality, two members were identified and a Ward Level Committee was constituted, headed by the elected member from the ward. By drawing three members from each Ward Committee, a Panchayat Level Committee was also set up. These popular committees played an important role in mobilizing the public and converting their enthusiasm into action. People were given the option of choosing from a variety of vermicomposting options – from standalone buckets for households to centralized composting pits for those who wanted to come together and manage them as a group. The emphasis on involving the community and public education before initiating SLWM was a key ingredient in the successful implementation of this initiative.

Source: WSP, *Documentation of Best Practices in SLWM*.

TRAINING PROGRAMME FOR TOTAL CLEANLINESS

7



by
Sudha
April 12 2011

Technology Options

Why provide a variety of technology options?

It is important to provide a range of technology options because:

- It helps people to choose an option that is most acceptable to them, based on their needs, local conditions and affordability;
- If people are informed and educated on the various technological options, it helps in the selection of technology with the highest degree of usability and sustainability; and
- Starting with a relatively simple and affordable option helps people to understand its benefits and convenience and they often add components or upgrade the technology option with time (Box 7).

What technology options are available to address solid waste?

Several options are available, ranging from simple to complex technologies, to manage solid waste. People find it easier to participate in simple solutions that are easy to understand and operate. An indicative list of technological options is provided in Table 3, categorised by the type of solid waste to be managed.

Box 7: Promoting a Menu of Technology Options: Example of East Midnapore District, West Bengal

One of the key factors in the success of waste management activities at the community level in East Midnapore is that people have the option to choose from a variety of technology options depending on their need and affordability. This includes relatively low-cost technology, for example, composting of kitchen waste using plastic sheets to more expensive options such as brick lined multi-pit vermicomposting. As people use these technologies and their benefits are demonstrated to them through manure, biogas, cleaner surroundings, and so on, they move up the cost ladder, often adding components they consider most useful, using their own resources.

Source: WSP, Documentation of Best Practices in SLWM.

Table 3: Indicative list of technological options

Biodegradable Solid Waste	
Composting	Any organic waste such as vegetable waste, garden waste, agricultural waste, cattle dung, and so on, can be composted. However, meat scraps and bones, and very oily waste should be avoided as these attract rodents and insects and can lead to odors. It is not necessary to have a structure as composting can be successfully carried out in any corner of a house yard or field. However, a structure such as a compost pit can retain the heat which helps to speed up the composting process and also improves aesthetics.
Vermicomposting	As against ordinary composting, which uses natural processes to break down organic material, vermicomposting uses various species of worms to break down the organic material, producing nutrient rich compost. Vermicomposting can be carried out in a vermi-tank or a vermi-bed.
Nonbiodegradable Solid Waste	
Recycling	Waste such as plastic, glass, metal, and so on (Figure 1) can be sold to a <i>kabadiwala</i> .

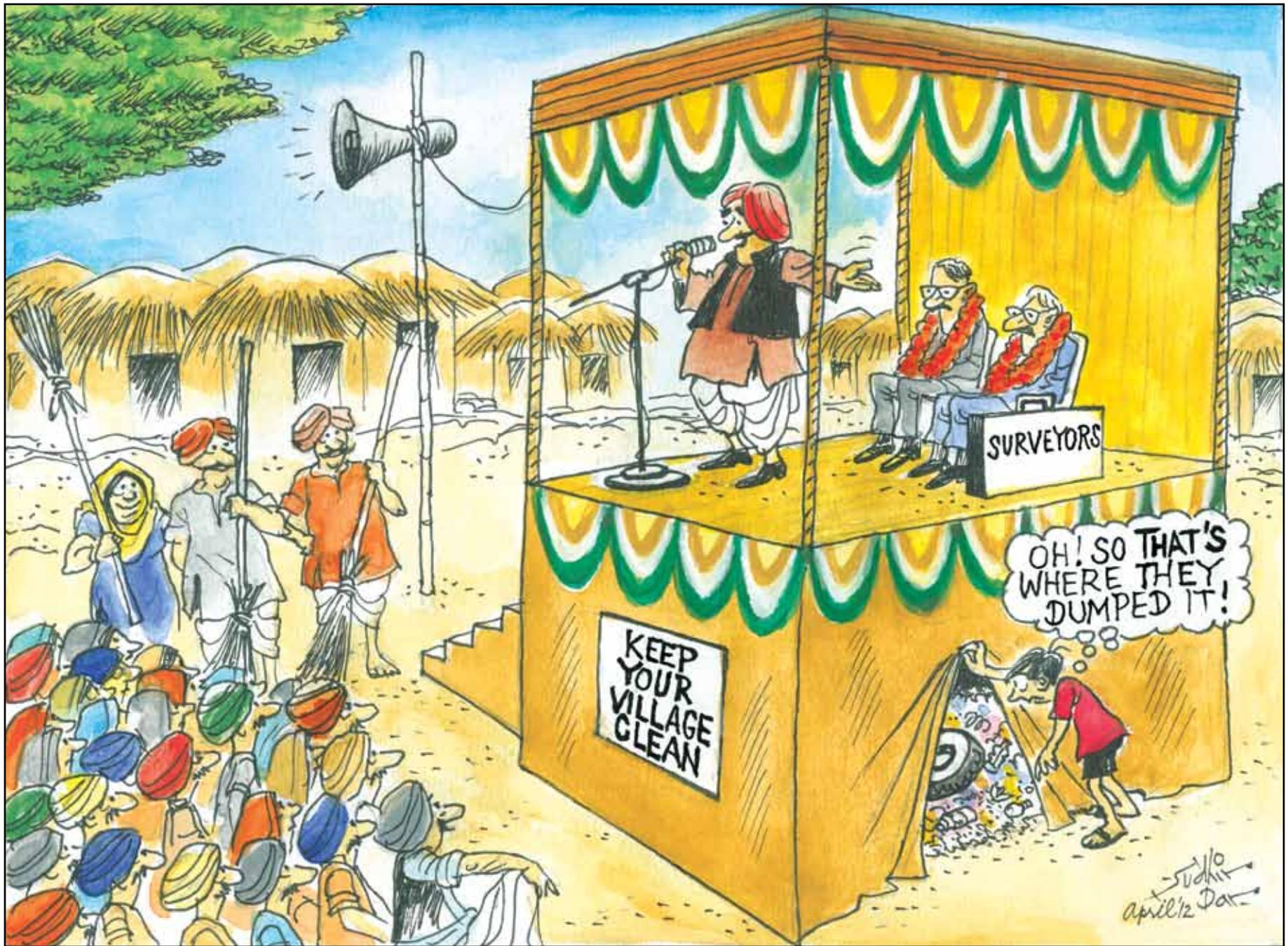
What factors should be considered when selecting a technology option?

Some factors that need consideration when selecting a technology option include:

- Characteristics of the waste being generated;
- Quantity and frequency of waste generation;
- Availability and affordability of technology options;
- Applicability of the technology option in the area; and
- Availability of skilled personnel, energy, O&M needs, land requirements, and so on.

What technology options are available to manage gray water?

Soak pit	A soak pit is a dug-out pit filled with stones, preferably placed over burnt bricks. It has a porous-walled chamber that allows water to slowly soak into the ground. This is a relatively inexpensive technology and prevents stagnation of wastewater.
Leach pit	A leach pit is a brick-lined circular pit constructed in honeycomb masonry, with a diameter of approximately one meter that allows water to percolate into the ground. The pit should have a proper insect proof cover. Water should be led into the pit through a water seal trap, so that insect movement and mosquito breeding is avoided.
Kitchen garden (with or without piped root zone system)	A kitchen garden uses gray water to grow vegetables, flowers or fruit in the courtyard of the house. This involves a simple surface irrigation system that requires low maintenance. It must be ensured that the gray water is treated before being let out into the kitchen garden which is achieved by passing water through a very simple device such as a silt and grease trap.
	A kitchen garden with a piped root zone system is an improved version of the basic kitchen garden. This involves underground irrigation using perforated polyvinyl chloride (PVC) pipes; water is treated in the filter bed material surrounding the pipe, from where it directly reaches the roots of the plants.
Three tank filtration	Three-tank filtration involves treating gray water through a three-part structure. First, water is passed through a grease trap into an inlet chamber, next into a treatment chamber filled with gravel and then into a second treatment chamber filled with sand. The treated water can be stored in an underground tank for subsequent reuse.



SURVEYORS

KEEP YOUR VILLAGE CLEAN

OH! SO THAT'S WHERE THEY DUMPED IT!

Sudha
April 12, 2011

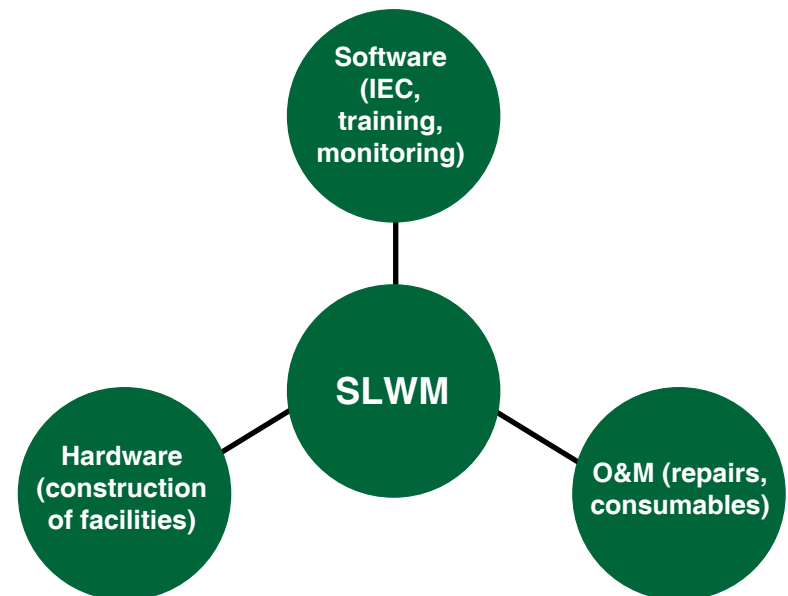
Financing, Incentives and Monitoring

What type of funding is required to implement a SLWM program?

The types of funding required to operationalize a SLWM program (Figure 3) are:

- **Software Component:** Funding for the software component is needed to support activities such as communication for demand creation and behavior change, capacity building of key stakeholders, monitoring, and so on;
- **Hardware Component:** Funding for the hardware component mainly includes capital expenditure, that is, the funds required to construct the infrastructure for the management of the waste; and
- **O&M Component:** Funding for the O&M component is needed to sustain the usability of the facilities constructed in terms of repairs, consumables, and so on. In comparison to hardware funding that may be larger but a onetime cost, the funds for O&M, although small, would be required in perpetuity.

Figure 3: Funding required for SLWM



What cost norms can be used to develop a solid waste management proposal at the GP level?

The typical cost norms specified in the National Strategic Plan for Rural Sanitation (2012-22) for a community of

300 households are provided in Table 4. In this example, the average capex per household comes to approximately Rs. 1,800. It also includes a sample cost of personnel salaries for operationalizing a waste management program. The actual cost, however, will depend on specific design considerations for a solid waste management project and could be in the range of Rs. 1,800-2,000. The smaller the number of households, the higher the capex per household will be.

Table 4: Typical cost norms for a solid waste management proposal for a community of 300 households

Particulars	Estimate for a Community of 300 Households
Hardware	
Compost pit preparation	Rs. 50,000
Tricycle (3)	Rs. 30,000
Containers (600, 2 per household for segregation of waste)	Rs. 30,000
Uniforms for sanitary workers	Rs. 20,000
Construction of segregation shed	Rs. 4,00,000
Tools	Rs. 10,000
Sub-total	Rs. 5,40,000
Personnel	
Supervisor salary	Rs 6000
Workers salary (10 @ Rs. 3,000/month)	Rs 30,000
Sub-total	Rs 36,000

What cost norms can be used to develop a liquid waste management proposal at the GP level?

Assuming that water supply to households is 70 liter per capita per day and estimated wastewater generation is about 80 percent of water supply, wastewater generation per household per day shall be of the order of 280 liter. Further, assuming an average of five persons in each household and considering black water generated as 7 liter per person per day, the volume of gray water from each household would be 245 liter. The typical conservative cost norms specified in the National Strategic Plan for Rural Sanitation (2012-22) for a community of 300 households are provided in Table 5.

Table 5: Typical cost norms for a liquid waste management proposal for a community of 300 households

Particulars	Estimate	Capex Cost per Household in a Community of 300 Households
Soak pit (unlined, 1 per household)	Rs. 600	Rs. 600
Stabilization pond	Rs. 80,000	Rs. 267
Drainage channel (approx. Rs. 10,000 per sq m)	Rs. 1,00,000	Rs. 333
TOTAL		Rs. 1,200

The actual cost for a liquid waste management project shall depend on specific design considerations such as the geographical spread of the GP, soil conditions, population density, and so on, for a liquid waste management project. As a guidance tool, the range may be from Rs. 1,200-1,750 per household. The smaller the number of households, the higher the capex per household will be.

Table 6: Potential sources of capital expenditure on SLWM

Household	Households are the primary beneficiaries of SWLM, from health and economic points of view. Therefore, if mobilized effectively, they can provide complete financial support, especially for household level interventions and complete or partial support in case of community level interventions. Poor households may not be able to provide financial support but may extend support in the form of voluntary labor, if required.
Award Money	The award money from NGP and several other state specific awards can be channeled to support SLWM initiatives.
Community and Commercial Establishments	Community and commercial establishments, where SLWM initiatives are implemented, can be a good collective source to seek funds, if motivated properly.
Gram Panchayat	The current financial base of GPs has improved over the years with the introduction of several forms of taxes and revenue generation streams (for example, rental from shops, lease of lands, and so on). Depending on their financial health, GPs can be a good source of funding.
Government Schemes/ Programs	<p>There are many government schemes and programs that can provide financial support:</p> <ul style="list-style-type: none"> • TSC: Funds under TSC, supported by the Ministry of Drinking Water and Sanitation, are available for both hardware and software activities with partial support of households and communities; • Mahatma Gandhi National Rural Employment Guarantee Act: Supported by the Ministry of Rural Development, the funds under this program are a good source for constructing roadside drainage, soak pits, and so on; • 13th Finance Commission Award: The Commission has specifically recommended use of grants in the areas of sewerage and solid waste management; • Sarva Shiksha Abhiyan, Integrated Child Development Services, Mid Day Meal Scheme: Funds from these schemes can also be mobilized to support SLWM in schools and anganwadis; • National Biogas and Manure Management program: The program run by the Ministry of New and Renewable Energy provides financial support for the construction of biogas plants and toilet-linked biogas plants along with partial support for software activities; and • National Project on Organic Farming: The project is supported by the Department of Agriculture and Cooperation, Ministry of Agriculture, and provides funds for capital investment to set up agro-waste compost units. <p>These resources can be converged especially at district, block and GP levels to ensure an integrated pool of resources for SLWM initiatives.</p>
Corporate Sponsorship	Corporate groups have started to support development activities as part of their Corporate Social Responsibility (CSR) initiatives. Their CSR funds could also be mobilized to support SLWM activities.

Donor/Grant Making Agencies	Many funding agencies (national and international) provide funding to support waste management initiatives that can be mobilized.
Engaging Private Operators for Construction and Maintenance	Waste management initiatives could also be planned in partnership with private organizations based on mutual interest and need. For example, to set up a community based biogas plant, a GP can provide land while private organizations can construct and operate the digester.
Bank Loans	Finance for waste management initiatives could also be secured through bank loans if the project has an inbuilt viable business model.

Box 8: Recovering O&M Expenses through User Fees – Example of Konni Panchayat in Kerala

A biogas plant linked to the fish and vegetable market has been set up by Konni Gram Panchayat. To run a biogas plant efficiently, at least 600 kilogram (kg) of garbage is needed per day. Therefore, the Panchayat decided to involve all the shops in the main market and surrounding areas. Today, each of the 780 shops in the area is part of the initiative. Negotiations were conducted with the local market association on user charges and shopkeepers pay Rs. 50 per month per shop to have the waste collected. Hotels too have agreed to pay Rs. 2 per kg of waste collected from them by the Panchayat. This money, according to the Panchayat, is sufficient to cover the running costs of the project. Each of the shops has been provided with color-coded plastic buckets to segregate their waste into biodegradable and nonbiodegradable. To collect this waste, the Panchayat has selected and trained 15 women from the local *Kudumbashree* (SHG) group. They are paid around Rs. 2,000 per month and collect the waste from the market twice a day to feed the biogas plant. Two pick-up vans have been bought by the Panchayat to transport the waste to the plant. The power from the plant, with a capacity of 30 lights, is used for lighting the market area.

Source: WSP, Documentation of Best Practices in SLWM.

What incentives are available for SLWM initiatives?

The NGP includes SLWM as an assessment indicator to ensure that local governments not only achieve ODF status but also address SLWM. Some state governments have also initiated state level reward programs which contain SLWM

as one of the main indicators for assessment, for example, the Maharishi Valmiki Sampurn Swachata Puraskar of the Government of Himachal Pradesh, and the Sant Gadge Baba Gram Swachata Puraskar of the Government of Maharashtra. A few states such as Kerala, West Bengal, Sikkim and Himachal Pradesh have also developed state specific operational guidelines and action plans for SLWM.

How can SLWM initiatives be monitored at district and Panchayat levels?

At GP level, monitoring can be undertaken by Panchayat members or ward members in different wards or hamlets of a Panchayat.

At the district level, the District Water and Sanitation Mission is the key institution for monitoring.

The areas of monitoring could be proper implementation of software activities; waste management behavior of households, community, institutional and commercial establishment; construction of hardware as per norms and quality; regular collection of sanitation or waste tax; functioning of O&M systems; norms/standards and rules related to waste management; and so on. Data on these indicators can be collected regularly and shared with district teams.

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- Gray Water Management, a presentation made by Dr. S.V. Mapuskar, Director, Appa Patwardhan Safai & Paryawarna Tantraniketan, 2007.
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- Manual on Solid Waste Management, Ministry of Urban Development, Government of India, 2000.
- Van Wijk, C. and Tineke Murre (undated). *Motivating Better Hygiene Behavior: Importance for Public Health Mechanisms of Change*. IRC International Water and Sanitation Centre.

Web Resources

- www.ddws.gov.in
- www.waste.nl
- agricoop.nic.in
- www.mnre.gov.in

Also Available

Nirmal Bharat: A Journey Through Clean India (English, Hindi, Oriya and Kannada). Available on DVD, 19 minutes.

Nirmal Bharat: A Journey Through Clean India (English, Hindi). Available on DVD, 9 minutes (Short Version).
<http://www.youtube.com/watch?v=YL7w14RQAyo&feature=plcp&context=C4545dbaVDvjVQa1PpcFNerV1QUUtKEi0zN6cygVzsCOh68kKxUS4%3D>

Easy as ABC?: Technology Options for Waste Management in Rural India (English, Hindi, Oriya and Kannada). Available on DVD, 23 minutes.





सत्यमेव जयते



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