



Synthesis Document: Sustainable Solid Waste Management Systems in Rural Areas

ABSTRACT

As the Swachh Bharat Mission of the Government of India expands, solid waste management will have to keep pace. This thematic discussion on the India Chapter of SuSanA examines the readiness of local government institutions, tasked with the job, to effectively plan and implement solid waste management systems.

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Introduction

India has 250,000 Gram Panchayats consisting of around 650,000 villages. Around 64.6 per cent of the population lives in rural areas and are governed by the Gram Panchayats. Taking forward the work done under Swachh Bharat Mission I, the second phase SBM II consolidates the gains.

One of the aspects is solid and liquid waste management (SLWM). Here, solid waste management (SWM) is critical for improving liquid waste management since mismanaged solid waste is a major contributor to choked drains and treatment systems. Rural solid waste contains organic waste and inorganic waste in the form of kitchen waste, paper, plastic, textiles and agricultural refuse.

SWM in rural areas remains a major problem due to the lack of proper waste collection, treatment and reuse facilities and services. There are issues with economies of scale, access to markets for recycled products and funds flows. Management of solid waste in rural areas is necessary for environmental sanitation and improving the quality of lives. The approach under SBM II is infrastructure-led but there are many other issues that need addressing for effective SWM.

The SWM eco-system includes behaviour change for effective segregation, market linkages for the sale of compost, the economies of scale, formal or informal management systems, institutional arrangements to ensure sustainability, financing, and convergence between different departments.

Therefore, a sustainable SWM and resource recovery system demands several factors to be considered including the technical, social, legal, environmental, and economical factors. This system has to have affordable, long-term and cost-effective, efficient solutions for all the solid waste that is generated in the target area.

The SBM Guidelines on SLWM

SLWM is one of the key components of Swachh Bharat Mission –Gramin Phase II (SBM II). To implement SLWM initiatives, ownership at the grassroot level and community involvement at all stages is an imperative. Behaviour Change Communication (BCC) and Information, Education, and Communication (IEC) interventions ought to focus on creating demand for a sustainable system by communities that in turn leads to better services. This in turn, should lead to setting up systems for waste disposal in a way that it has a demonstrable impact on the rural population. The community and panchayat have to be motivated to understand the need of SWM and, therefore, come forward and mandate such a system, which they can operate and maintain in the long run.

Awareness and education campaigns should aim for panchayat officials, elected representatives, schools, non-governmental organisations (NGOs) working in villages and the public. Under the guidelines, the GP representatives are responsible for the design, implementation, operation and maintenance (O&M) of SWM systems with the support from

district and state governments. Mechanisms for involving third parties in the construction and management activities by the GP are also available. In such cases, absolute clarity pertaining to the roles and responsibilities of various stakeholders in managing SWM systems is needed. Community contributions and appropriate user charges for sustainable SWM initiatives can be considered.

Financing SWM under the SBM-G

Funds for SWM projects under SBM-(G) are provided by the central and state governments, which if required, can be supplemented by dovetailing funds from other programmes and sources such as:

- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS);
- Member of Parliament Local Area Development scheme (MPLADS);
- Member of Legislative Assembly Local Area Development scheme (MLALADS);
- The 15th Finance Commission;
- Corporate Social Responsibility contributions;
- Swachh Bharat Kosh (SBK);
- Donors; and
- Programmes of other ministries and departments.

The maintenance cost for the first five years can be included as part of the project cost.

Setting up sustainable SWM in Rural Areas

It is important that sustainable SWM systems are set-up and implemented for all rural areas to ensure that all solid waste is collected, segregated at primary source, and processed/disposed of in a proper manner with minimum impact on the environment. The system also should aim to reduce the amount of waste generated, through awareness raising and education of the population, as well as maximising recycling, processing, and upcycling.

There are several good examples of sustainable SWM systems and resource recovery across India. For instance, in Punjab, solid waste from the water treatment plant in Jalandhar city is reused in preparation of plant nurseries. Plants from this nursery are distributed to nearby towns and villages. With these efforts, surroundings of Sultanpur Lodhi have turned into a greenbelt.

This thematic discussion aims to bring forth such examples of sustainable SWM systems across the country, and to serve as a guiding light to those who want to clean their villages but do not know where to start or what are the different aspects to setting up SWM systems and how to make them sustainable. We were seeking answers to the following questions:

- How would you mobilise the community to demand better and sustainable SWM systems in rural areas to ensure preparation and participation? Please provide examples from your experience of BCC and IEC approaches and activities that have worked?
- How would you plan for setting up sustainable SWM systems, and what are the critical factors to be considered while planning for the same? What are the components of such a system?
- How do you organise and coordinate activities among different agencies for sustainable SWM systems?

This thematic discussion was facilitated by Pramod Dabrase, international SWM expert, CSEDI. It was open for comments for 3 weeks until 9 September 2022. The information provided would help prepare operational suggestions for SBM 2 and will be shared with DDWS.

Discussion Summary

Pramod Dabrase, said in his opening comments that the scale (Gram Panchayat or village) at which this must be managed may sound micro, but in reality, it is not practically possible do it at micro level, particularly for dry and hazardous waste. Biodegradable waste, on the other hand, must be managed locally. Dry waste and hazardous waste constituents of the solid waste hardly have any solutions locally for disposal, and are highly dependent on external linkages including markets, industries, manpower, institutions, finances, technologies, etc. It has therefore become imperative for authorities and key stakeholders to facilitate appropriate planning, implementation, management, and operational arrangements at higher governance levels (clusters, block, district, etc).

On the other hand, most Gram Panchayats and even districts have limited capacities required for addressing various challenges around SWM including planning, technology, and operation and maintenance. The support system including support organizations, technical experts, NGOs, and other agencies with adequate and relevant subject understanding is another major challenge. Even more important and challenging is the procurement and tendering policies and processes to hire these agencies.

Despite these challenges, several islands of success in several villages, Gram Panchayats, districts, towns, and cities have demonstrated ways and means that can possibly lead to sustainable SWM. This however would require more serious efforts, innovations at all levels.

Participants in the discussion covered the following questions.

How would you plan for setting up sustainable SWM systems, and what are the critical factors to be considered while planning for the same? What are the components of such a system?

RECOMMENDATIONS

- Avoiding and reducing the amount of waste generated is the priority.
- The formulation of local strategic plans for solid waste management should be considered at the initial stage
- Better coordination for effective implementation of a solid waste management collaborative project is required by the various agencies involved in solid waste management
- It is important to ensure that public and decision makers' awareness activities are incorporated in SWM projects
- Effective application of economic incentive measures and private sector resources in SWM requires human resources to design and manage such schemes.
- Human resource development in financial planning and management is necessary and often a key to the development of self-financing schemes.
- It is necessary that the system is monitored continuously, and corrective measures are taken for its smooth functioning.

A sustainable SWM system is one where the costs of waste management are borne by the returns generated from processing and sale of waste. Estimates show that by the fourth or fifth year, such resource generation will have to be at least a 50% of the cost of the operations and maintenance of the system. Government subsidies or user fees may cover the remaining part. The fixed capital for the system must be paid by government. Otherwise, the O&M costs will become very prohibitive.

Finding the appropriate scale to set up centralized systems is another challenge. In many parts of coastal Odisha, the four- or five Gram Panchayats together can form a viable unit. But in large tracts, any centralized facility will not be easily viable, as the unit of operations for such facilities will be villages spread over at least a block with distances of more than 30-40 kilometres in one direction. In such cases, far more decentralized options will be needed. This challenge is like that faced in managing faecal sludge.

Respondents said the first step to ensure sustainability is to be able to develop approaches, programmes and monitoring tools that suit the specific rural contexts. Gram Vikas has been able to delineate four parameters around which villages can be categorised: nature of location – peri-urban, rural, remote rural; density of population – high, medium, low (often co-terminus with the nature of location, but there are exceptions); nature of local markets – highly integrated with urban market trends, on way to integration, still comparatively low integration; and dependence on natural resources for livelihoods – low, reducing, still high. If these variability factors are brought in at the design stage itself, it is possible to devise more appropriate strategies.

Further, the Environment Support Group (ESG) has been involved in initiating resilient and sustainable structural reforms in waste management through field, policy, and legal interventions for over two decades now. Their work, as noted by Leo Saldanha, primarily based out of Bangalore metropolitan area (14 million) and Karnataka State, is in coordination with similar efforts nationwide. ESG works closely with trade unions advancing labour, occupational and health rights of those handling waste, and also with vulnerable communities suffering serious health issues due to waste disposal, to ensure their Rights to Health, Clean Environment, Life and Livelihoods.

Overall, their [approach](#) is to consider prevailing waste management as emblematic of the nature of prevailing governance which is centralised and corporatized, with weak (or no) democratic participation, and such factors constitute a major reason for the prevailing woeful state of affairs – in ‘waste management’ as it is with municipal and rural governance.

Hemalraj, WASH Consultant with UNICEF Gujarat noted these other crucial factors as well:

- Mapping and identification of community dumping sites, public places with litter, sanitation workers, existing practices, finances, and infrastructure to develop SWM systems.
- Quantification of the type of waste generated in the village at household, institution, and community level.
- Identifying and brainstorming the technologies to be feasible in local context for collection, segregation, treatment, and disposal.

- Market linkages with recyclers, scrap dealers, nursery, and organic farmers for sale of treated and segregated waste to inculcate business models.

How would you mobilise the community to demand better and sustainable SWM systems in rural areas to ensure preparation and participation?

The first step is to garner as much as community support as possible, followed by that of the Gram Panchayats. An important aspect to the planning of sustainable SWM system would be contribution of the community members in terms of a nominal monthly user fee. The remaining amount of the budget can be funded through various schemes like the 15th Finance Commission, State Finance Commission, Swachh Bharat Mission, MGNREGA, NRLM, etc. or through private donations.

For instance, all of Gram Vikas' work in the villages is led by a village level institution. The Village Development Committee, consisting of representatives from all households in the village leads the effort and owns it. The work on sanitation and hygiene are actively taken up by women's groups, children's groups, and adolescent groups. For SWM, the focus was almost entirely on household-level segregation as the first step. This helped in creating strong in-situ evidence for each household on the kind of waste they were generating. This also helped in creating discipline in ensuring that wet, bio-degradable waste is not thrown out with other waste materials.

The household level work was carried out through meetings with the different institutions and through volunteers from these groups conducting door-to-door campaigns. In doing these, Gram Vikas adopted different key messages for different types of villages. For thickly populated villages with very limited free open space and larger volumes of non-bio wastes, people were mobilised to work closely with the Gram Panchayats to provide for waste collection/processing facilities. In two cases, Gram Vikas supported clusters of villages to set up these facilities as a demonstration. In such cases, the source segregation is done in a more nuanced manner.

In remote areas, with low population density and availability of more open spaces, the strategy for Gram Vikas has been to avoid littering of waste in public spaces. The collected waste is disposed of by the village through burning or landfills. This is done in places where it is not economically viable to generate any returns from sale of these waste items.

Other possible approaches noted by respondents included:

- The community could be mobilized through engaging them from needs assessment to monitoring for SWM systems to work sustainably.
- The identification of sites of generation of waste, open dumps and disposal sites through community transect walk.
- The lifestyle changes of rural populace and practices around solid waste are to be brought forth through group meetings with elders and opinion leaders.
- The community cleanliness campaigns of public places should be taken up quarterly to provide sustained movement for litter free villages.
- To hammer continuous SBCC messages around linkages with health and solid waste management system. The promotion of waste collection, segregation and scientific disposal to visual cleanliness and sustainable environment through innovative songs and street plays.

Please provide examples from your experience of BCC and IEC approaches and activities that have worked?

SWM promoters, in association with GP functionaries, needed to plan for a series of activities to educate the community on why to scientifically manage solid waste; how segregation at source helps in reducing waste and maximising recovery and recycling, and the impact of poor SWM on health, environment and economy.

Based on UNICEF Gujarat's work, respondents noted approaches that have worked include the incentivization of people and businesses towards segregation and scientific disposal of solid waste, along with dis-incentivization of waste dumping in open and waste burning through penalties. Approaches have also included community cleanliness campaigns through children has enabled empowering families and increasing frequency and engagement of households for waste collection through public addressal systems. These have been backed by provision of community composting spaces for animal waste and agricultural produce waste.

Respondents also drew examples previously shared in a discussion (on the impact idol immersions have on water and the environment) on the United Nations Solution Exchange Water Community of Practice. Respondents noted what is critical is a well-conceived publicity campaign to educate people about the pollution from idols. At the immersion sites, NGOs and authorities can provide bins for people to throw flowers and other used prayer material. They can create a people's workforce to clean the area as quickly as possible after the event, or employ local ragpickers, and totally ban the public from throwing plastic into the water.

In Kerala hundreds of thousands of pilgrims visit the Sabarimala temple every year. They throw their old clothes in the river Pampa nearby, and also defecate on its banks even though the authorities have provided toilets. The river is the only source of drinking water for local people. Recently, some volunteers have set up wire meshes to stop the clothes from flowing down the river. This is one example of volunteers and authorities working together to reduce pollution.

Along with this end-of-pipe approach, the authorities can stipulate quality standards for the idols. They can specify the material the idols will be made of, and the type of paints allowed. For example, they can permit only the use of degradable material for making idols and natural colours for painting them. Along with this, they can specify the regulatory measures for preventing use of non-conforming idols. The local administration can reduce the pollution from these idols by removing them as soon as possible. To be successful, the authorities need to precede this enforcement drive by an awareness campaign.

For example, during Ganesh Chaturthi in Delhi, a voluntary organization worked with religious leaders and local authorities to ensure the floral offerings are composted instead of being thrown into the Yamuna River. As part of the campaign, the NGO ran an awareness and participation for the youth and identified practices that would not hurt people's religious sentiments. Another campaign in Delhi advocated the use of clay idols painted with natural colours.

In Hyderabad, people immerse idols in the Hussain Sagar Lake. The clay content of idols is of less concern than the paint used to colour them and plastic bags. Here again, the authorities need to work with idol makers to use vegetable dyes, and with people to discourage them from throwing plastic bags into the lake. In 2009, the West Bengal Department of Environment took up the idol issue with paint manufacturers, who agreed to produce only lead-free paints; the local prayer organizers also bought idols coloured with these paints. The municipality also

provided many dustbins for people to throw their solid waste; the river was noticeably less polluted.

In Pune, during the 10-day Ganesh festival, the municipality provided large bins along the river for people to throw flowers and other offerings. They also provided large water tanks for idol immersion. They also ran an awareness campaign to inform people about these facilities, instead of following their regular practice of immersing idols in the river.

Organizations or authorities who want to tackle the problem of pollution caused by idol immersion have to begin the process with an intensive public education campaign. They can work with local religious leaders and people who organize prayer meetings or events to encourage them to use only clay idols painted with vegetable colours. With them, they can identify suitable immersion sites that can be specially created ponds. The organizers can provide bins to collect dry waste like flowers and other left-over material. Once the immersion event is over, the NGO or authorities can deploy volunteers to collect and dispose material and arrange for suitable water treatment before allowing the water to enter the river, pond or lake.

How do you organize and coordinate activities among different agencies for sustainable SWM systems?

Respondents noted that the current focus on SWM in the Swachh Bharat Mission-2 is paving way for a very centralized, top-down, fund utilization-driven approach to SWM planning. This is resulting in very standardized solutions being thrust from the top. There needs to be far more coordination of local stakeholders – Panchayat Samitis (Block level PRI), Gram Panchayats, voluntary groups, trader/business lobbies, non-government organisations and local colleges/schools – for developing any meaningful solution. Funds should be allocated for achieving results and not based on a standard approach to providing inputs.

Other approaches mentioned by respondents include:

- *Needs assessment and planning:* PRIs, local NGOs, youth groups, SHGs and Sanitation workers are to be brought on common platform to understand village level systems, practices, traditions, and planning by SBM-G staff. Integrate with existing GPDP with capacity building and consultations.
- *Source level segregation and treatment:* Converging of 15th FC funds and MGNREGS to develop facilities of dustbins, compost pits and biogas plants. SBM-G to support SBCC activities to promote segregation and treatment at source level.
- *Waste collection and cleanliness:* Support of waste collection vehicles and community compost pits from SBM-G, 15th FC and own funds to promote regular collection of waste. Developing route plan for optimized waste collection with PRI stakeholders.
- *Segregation:* Identification of sanitation workers and ragpickers to support the solid waste management providing them capacities and ownership through SBM-G and funding through 15th FC, own funds, and business model.
- *Treatment:* Infrastructure for segregation and treatment can be developed from support with SBM-G and MGNREGS to promote treatment of organic waste and storage for non-biodegradable waste.
- *Market Linkages and institutional partnerships:* Convergence with Agriculture department and MNRE to promote treatment of and sale of organic waste. Linkages with scrap dealers, recyclers, and road construction companies for segregated waste disposal.

As a follow-up to this discussion, the SuSanA India chapter in collaboration with IRC, Water For People, WaterAid and the India Sanitation Coalition (ISC) conducted a webinar on the topic to highlight examples and challenges of rural SWM from practitioners who have implemented activities in their villages. This was organised on 14th October 202

The webinar covered issues with economies of scale, access to markets for recycled products and funds flows. The SWM eco-system includes behaviour change for effective segregation, market linkages for the sale of compost, the economies of scale, formal or informal management systems, institutional arrangements to ensure sustainability, financing and convergence between different departments. Therefore, a sustainable SWM and resource recovery system demands several factors to be considered including the technical, social, legal, environmental, and economical factors. This system has to have affordable, long-term and cost-effective, efficient solutions for all the solid waste that is generated in the target area.

Webinar summary

The webinar was facilitated by Pramod Dabrase. The speakers were Asad Umar, Aga Khan Foundation, Imtiyaz Ali, Saarthak, and Arka Sinharoy. Asad provided an overview of the issues in Uttar Pradesh, and AKF's approach at the macro-level along with examples. Imtiyaz spoke about the system Saarthak has put in place in over 100 panchayats in Bhopal, Madhya Pradesh. Arka spoke about a project to Collect Only Wet Waste (COWW) in three peri-urban municipalities of Bihar.

Asad said SWM is a problem at the panchayat level, and they lack the technical capacity to make plans to tackle it. Overall, rural areas generate about 0.3-0.4 tonnes per day. It can be a sustainable business. But challenges include the lack of investment in building capacities of PRI representatives and a shortage of dedicated technical experts.

There are many opportunities under SBM II that has given a focus on SWM, and technologies are available as are good models. Panchayats can either manage SWM in-house or through service contracts with another agency. There are good examples from Andhra Pradesh, Madhya Pradesh, Karnataka and Gujarat, he said.

1. Ramayampet and Velichala Gram Panchayats /Medak- use of technology
2. Gram Panchayat/ Kalibillod Indore - Profitable business is possible – GP, SHG and consultant working together
3. Experience of solid waste management in Karnataka and Gujrat/ Saahas, segregation at source and management of dry waste
4. Experiences of behaviour change promotion in sustainable ways/ Coimbatore/ Exnora Green/- waste to resource where GOBARDHAN is the guiding principle

The journey starts with a waste survey, community preparation, logistic management, technical management and financial management, he said (Figure 1). Organic and food waste is 75% of the waste in rural areas. The rest is paper, plastic, glass, and metals. The per capita quantity averages 0.6 kg per day.

In UP, 3,582 panchayats with a population of over 5,000 have been selected for SWM in the first phase. AKF has demonstrated several community-centric models and provided demonstration models in districts. It has conducted district workshops and trained resource persons. It has also developed SWM plans for 14 panchayats. Dustbins have been installed,

and waste collection and segregation has been put in place. Local safai karmis have been appointed by the district administrations. Organic waste could be co-composted with cowdung in gobar gas plants. Waste management has to be localised and convergence between departments is necessary.

Imtiyaz Ali, Saarthak said they have implemented dry waste management in rural areas around Bhopal. Segregation sheds have been set up. In each village cycle rickshaws are used for collecting waste, operated by SHG women from SC/STs. The collection mechanism is monitored by GPS. The waste is processed in the sheds and comprises recycled plastic waste, paper, multi-layer plastic, metals and glass. There is one collection point for 10 panchayats. Saarthak has recommended that each district should have a processing a shed to the state government.

Each shed has a shredder, where plastic is shredded for road construction. Panchayats bring the waste to the sheds, that is logged. Human hair is collected and is converted into liquid manure as are animal bones. This is sold at Rs 12/kg. 14% plastic is being collected, of which 10% is non-recyclable and is used for road building @Rs 14/kg. all over waste is being sold to recyclers. Agricultural waste and cowdung is converted into raw materials for energy generation. Multi-layer plastic is used in cement production as an alternative fuel.

The target is to ensure the user fees and sales will cover the salaries of the staff in six months and SHGs can break even. The process is monitored via an app. Imtiyaz said there are plans to expand the project to 200 villages and cover an entire block. Bio-medical waste is collected and sent to specialised agencies. The stress has been on community participation to encourage segregation at source.

Arka Sinha Roy said in October 2021, AKF started a SWM peri-urban programme in three municipalities of Bihar through an NGO called Gram Swarajya Samiti Koshi. It was called Collect Only Wet Waste (COWW). There was a lack of human resources, and inability to facilitate daily waste collection. Therefore, GPs were overwhelmed and unable to provide SWM services. There was no revenue either.

To break this cycle, AKF and GSS launched COWW. Wards and villages collected only wet waste daily while dry waste was collected weekly. The wet waste was composted while the dry waste was sorted and sold. This process reduced the burden of segregation and time for tipper vehicles. It also improved waste to resource generation efficiency as waste processors could tackle large quantities, from 900 kilos per day to over 4.5 tonnes per day.

The process involved characterizing waste, and sorting out the transportation and segregation, the frequency and timing of collection, and processing. Households in the area generated about 550 gm each. A survey indicated there was a strong demand from communities to improve the situation.

The process was piloted in three mohallas where the behaviour change took time. The early adopters were given stickers. Source segregation improved from 35% to 90%, efficiency improved and waste build up was eliminated. Partitioned hand carts were provided. The processing time for wet waste improved. With COWW the processing ability nearly quadrupled and wet waste was composted. SHG led business models was implemented. The process was scaled up. The dry waste was sold to recyclers.

The speakers were:

- Nitya Jacob, SuSanA: introduction to the topic and SuSanA
- Pramod Dabrase, international SWM expert, CSEDI Navi Mumbai: overview of rural SWM, challenges and successes from different states
- Asad Umar, Aga Khan Foundation: AKF's strategy in rural SWM and how it has supported state governments to develop and implement SWM programmes
- Imtiaz Ali, Sarthak, Bhopal: Tackling the issue of plastic waste
- Arka Sinha Roy, sanitation professional: The COWW approach in Bihar

The link to view the webinar is here: <https://youtu.be/mtHwBkh4Fao>

Participants

Name of Contributor	Organization	Country
Pramod Dabrase	Director, CSEDI LLP	India
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Resources and Links

1. SBM Phase II Operational Guidelines https://jalshakti-ddws.gov.in/sites/default/files/sbm-ph-II-Guidelines_updated_0.pdf
2. ESG's SWM approach: <https://esgindia.org/new/wp-content/uploads/2019/05/esg-pil-swm-mavallipura-hc-kar-nov-2012-1.zip>

The Thematic Discussion Series Host

This document was prepared by Nitya Jacob. It was reviewed by xxx, xxx

The Thematic Discussion Series on Sustainable Rural Solid Waste Management Systems was organised and hosted by the Sustainable Sanitation Alliance (SuSanA) on the SuSanA Discussion Forum Platform. The discussion is part of a series of online discussion taking place under the umbrella of the SuSanA India Chapter. It was facilitated by WaterAid India, the India Sanitation Coalition, UNICEF India and IRC.

To view the whole discussion, please go to the SuSanA Forum:
<https://forum.susana.org/regional-chapter-india/25469-sustainable-solid-waste-management-systems-in-rural-areas-thematic-discussion-by-susana-india-chapter>

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