सत्यमेव जयते

DEPARTMENT OF DRINKING WATER AND SANITATION
MINISTRY OF JAL SHAKTI

स्वच्छ भारत
एक कदम स्वच्छता की ओर

SUJAL AND SWACHH GAON

Resource Material for Field Trainers

DEPARTMENT OF DRINKING WATER AND SANITATION
MINISTRY OF JAL SHAKTI

Resource Material for Field Trainers

"Sujal and Swachh Gaon"

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GLOSSARY

ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
ATM	Automated Teller Machine
AWC	Anganwadi Centre
BAI	Builders Association of India
BASICS	Bhartiya Samruddhi Investments and Consulting Services
BCC	Behaviour Change Communication
BLS	Baseline Survey
BRC	Block Resource Centre
CBO	Community Based Organization
CFI	Credit Finance institutions
CPHEEO	Central Public Health and Environmental Engineering Organization
CREDAI	Confederation of Real Estate Developers' Associations of India
CRSP	Central Rural Sanitation Programme
CSC	Community Sanitary Complex
CSDC	Construction Skill Development Council
DDWS	Department of Drinking water and Sanitation
DGET	Directorate General of Employment and Training
DMA	Directorate of Municipal Administration
DWSC	District Water Sanitation Committee
DWSM	District Water Sanitation Mission
EoT	Evaluation of Training Programme
ESR	Elevated Storage Reservoir
FSM	Faecal Sludge Management
FT	Field Trainer
GoI	Government of India
GDP	Gross Domestic Product

GP	Gram Panchayat
GSR	Ground Storage Reservoir
HH	Household
HRD	Human Resource Development
IAY	Indira Awas Yojana
ICDS	Integrated Child Development Services
IEC	Information Education Communication
IMF	International Monetary Fund
IPC	Interpersonal Communication
IPSC	Indian Plumbing Skills Council
KRC	Key Resource Centre
KSA	Knowledge, Skills and Attitudes
KVIC	Khadi and Village Industries Commission
lpcd	litre per capita per day
MAVIM	Mahila Arthik Vikas Mahamandal
MHM	Menstrual Hygiene Management
MWM	Menstrual Waste Management
MNREGA	Mahatma Gandhi Rural Employment Guarantee Act
NBA	Nirmal Bharat Abhiyan
NCVT	National Council on Vocational Training
NHM	National Health Mission
NRDWP	National Rural Drinking Water Programme
NRLM	National Rural Livelihood Mission
NSDC	National Skill Development Corporation
O&M	Operation and Maintenance
OD	Open Defecation
ODF	Open Defecation Free
ODF S	Open Defecation Free Sustainability
PHED	Public Health Engineering Department
PRI	Panchayati Raj Institution
PSU	Public Sector Undertaking
PVC	Polyvinyl Chloride
PwD	Person with Disability
RCC	Reinforced Concrete Cement
RDAT	Regional Directorate Apprentice Training
RWS	Rural Water Supply
RWSD	Rural Water Supply Department
SBCC	Social and Behaviour Change Communication

SBM (G)	Swachh Bharat Mission (Grameen)
SCGJ	Skill Council for Green Jobs
SDG	Sustainable Development Goal
SHG	Self-Help Group
SLWM	Solid and Liquid Waste Management
SME	Small and Medium Enterprise
SSC	Sector Skill Council
SSLC	Secondary School Leaving Certificate
STAC	State Technical Advisory Committee
TNA	Training Needs Assessment
ToT	Training of Trainers
TSC	Total Sanitation Campaign
UN	United Nations
UNICEF	United Nations Children's Fund
VLE	Village Level Entrepreneur
VWSC	Village Water Sanitation Committee
VWSS	Village Water Safety and Security

ABOUT THE RESOURCE MATERIAL

The Government of India (GoI) has launched an initiative to strengthen the capacity of Panchayati Raj Institutions (PRIs)to ensure the sanitation gains achieved under the Swachh Bharat Mission (Grameen) are sustained. The initiative includes ODF status of communities, taking up of an open defecation free plus (ODF Plus) agenda and improving access to safe and secure water supply through the Jal Jeevan Mission (JJM) Programme. Success of these initiatives is directly linked to the capacity and motivation of Gram Panchayat (GP) level functionaries, that is, the Sarpanch, GP secretaries and Swachhagrahis. It is important to strengthen the capacities of these functionaries to achieve desired results from, and acquire relevant information on, ODF Plus and JJM activities.

In order to reach out to over 250,000 GPs in the country, a large pool of field trainers (FTs) are required. The Department of Drinking Water and Sanitation (DDWS) is creating a pool of competent FTs to cater to the capacity-building needs of GPs. As a part of this initiative, 4 FTs will be identified from each district and will be trained through a five-day Training of Trainers (ToTs) in sanitation and water supply. These trained FTs will then train Sarpanches, GP/village secretaries and Swachhagrahis through 3-day trainings. The FTs will also be available to train other stakeholders in the districts.

This resource material has been developed to enhance the knowledge and skills of the FTs with regard to sanitation and water supply, including details on government schemes, implementation mechanisms of programmes, roles and responsibilities of PRIs, on action planning and on training methodologies. It also aims to orient the FTs appropriately to ably and diligently roll out the trainings of the PRIs and Swachhagrahis.

Contents of the resource material

This resource material is divided into five sections, consisting of components of the ODF Plus and JJM- initiatives. It describes the concept and components of a Swachh and Sujal Gaon, includes relevant case studies and lists additional references for further reading.

The contents of the manual are as follows:

No	Section	Details
1	Introduction to *Sujal and Swachh* Gaon	• Importance of sustainable water and sanitation service delivery • Concept of *Sujal and Swachh* Gaon • Introduction to JJM – Har Ghar Nal Se Jal
2	Safe and Secure Water Supply and Management	• Drinking water availability and demand in the village • Source sustainability and source augmentation measures • Operation and maintenance of water supply system • Essentials of water quality monitoring and surveillance
3	ODF Plus	• Sustaining ODF S • Operation and maintenance of toilet facilities • Solid waste management – biodegradable waste, Plastic waste and menstrual waste • Liquid waste management –greywater management • Faecal sludge management
4	Cross Cutting Interventions	• Resource envelope for water and sanitation facilities • Information education and communication (IEC) interventions for creating a *Sujal and Swachh Gaon* • Community-led action planning process for creating a *Sujal and Swachh* Gaon and support from district
5	Swachhagrahis	• Sustaining water and sanitation outcomes through Swachhagrahis • Function of the Swachhagrahi in a *Sujal and Swachh* Gaon • IEC and community mobilization activities by Swachhagrahis in *Sujal and Swachh* Gaon
6	Annexure	• Supporting documents

Target users

This resource material is developed for use by FTs to enhance their capabilities to effectively deliver PRI and swachhagrahi trainings. It is a companion handbook for the FTs. FTs are trainers/ facilitators with proven knowledge and skills in delivering work-based learning and with proven experience in the rural sanitation and water sector. The FTs will be the key functionaries in their districts responsible for rolling out trainings on ODF Plus and JJM.

How to use this resource material

For effective use of this resource material, the FTs need to read, understand and internalize the contents. They should study each section of resource material, with reference to the topics and sessions which will be delivered during ToTs. They should correlate sections of this with PPTs and other training material shared with them during their training for use while training the PRIs. It will also help them contextualize the PRI resource material.

SECTION 1

INTRODUCTION TO SUJAL AND SWACHH GAON

- Importance of Sustainable Water and Sanitation Service Delivery
- Concept of Sujal and Swachh Gaon
- Introduction to Jal Jeevan Mission

CHAPTER 1

IMPORTANCE OF SUSTAINABLE WATER AND SANITATION SERVICE DELIVERY

Key discussion points

- Appreciating achievements in creating ODF communities, sustaining them and gearing up for ODF Plus interventions
- Health, economic and social benefits of sustainable water and sanitation services
- Enabling factors and barriers in sustaining water and sanitation services
- SDG goals and present Government policies and programmes for rural India
- Importance of creating and maintaining a *Sujal and Swachh* Gaon

Following the achievements of the SBM (Grameen) programme, the GoI has envisioned the JJM to provide each household with household tap connections. The focus is not just on infrastructure creation, but on ensuring sustainable water and sanitation services for each rural household. India is fast heading towards universal toilet access and has a large piped water network; however, ensuring sustained service delivery is still a challenge. Community engagement and ownership is non-negotiable for adoption of safe, efficient, affordable and sustainable water supply and sanitation systems across communities. At this juncture, GoI is gearing up for ODF Plus and adopting strategies focusing on (i) achieving and sustaining 100 per cent ODF status for all communities (ii) sustain behaviour changes to ensure universal usage (iii) address issues of FSM, plastic waste management, biowaste management and solid and liquid waste management (SLWM). For water supply, the focus is on safe and secure piped water supply to all houses in rural India. In this chapter, insights into the present status of sanitation have been discussed. Sector specific issues and challenges to water sustainability and ODF Plus have also been explained.

1.1 Achievements in ODF, issues in sustainable water and sanitation and gearing up for ODF Plus

The SBM (G), a flagship program for rural sanitation, took the form of a Jan Andolan as it aimed at eliminating open defecation in India. The objectives of these programmes are in line with the SDG goal 6. In 2018 the DDWS (of the then Ministry), GoI also launched Swajal, a drinking water supply programme specifically aimed at reaching the previously unreached population within 'aspirational districts'. The JJM is another flagship program that aims to provide piped water supply through household tap connections to the entire rural population. A community-led approach with GPs being responsible for the O&M, provisions for source sustainability, recharge and reuse of greywater and focus on solar energy use are the key features of these programmes.

The Department has strongly emphasized the need to focus on sustainability of interventions and services in all its communications and engagements with states and stakeholders with respect to both the programmes. Several advisories and guidelines have been issued from time to time to support states and districts achieve sustainability of water and sanitation services.

Water supply

Around 76 per cent of rural habitations in the country comprising 71 per cent of the country's population have full access to 40 litres water per capita per day. 56 per cent of the rural population has access to piped water supply.[1]

Though significant growth in water supply coverage has been achieved in the country, there are still issues of source sustainability, system sustainability, water quality and O&M.

Majority of the rural drinking water sources are sourced from groundwater. Increasing demand of water for agriculture and other competing uses, changing rainfall patterns and climatic variability, low groundwater recharging and poor community management of groundwater resources are often leading to source failures.

As per the 73rd Constitutional Amendment, the responsibility to operate and maintain water supply schemes lies with the panchayats. Sustainability of village level water supply systems and water quality issues are linked to adequate O&M of the systems. A system becomes sustainable if it is technically, financially and institutionally viable and is socially acceptable as well. All these aspects impact the functioning of the schemes.

There are many complex geo-genic and anthropocentric factors that impact the drinking water quality. Identifying and implementing sustainable and user oriented/ friendly solutions which can be implemented in a decentralized manner is a challenge.

In almost all the above-mentioned issues, one of the main constraints is managerial and technical capacities. Some of the indicative capacity constraints of the technical staff are related to the ability to design systems using latest tools, promote metering management, plan tariff structuring, monitor delivery, ensure water quality management, adopt a concept of catchment to consumer, etc. Similarly community and PRI level capacity constraints are related to O&M management, financial management, local water governance, behaviour change management, etc.

To address these constraints, the capacity of stakeholders to implement various stages, planning, implementation and O&M, in the project cycle needs to be enhanced. Also important is the need for sustainable management of systems and sources.

Sanitation

The country is almost ODF with more than 99 per cent of households having access to toilets. Six hundred and 24 districts, 6,287 blocks and 2.52 lakh GPs have been declared ODF[2]. The focus is now on the sustainability of the ODF status and on ODF Plus interventions. The DDWS has issued a national ODF S guideline and advisory[3] to guide the states and districts in sustaining the ODF status. The goal is to ensure that every member of every household in the country regularly uses the toilets built, and wholly adopts and internalizes safe sanitation behaviours. The ODF definition issued on 9 June 2015 by the Government forms the basis of these guidelines[4].

Definition of ODF

ODF is the termination of faecal-oral transmission, defined by a) no visible faeces found in the environment/village; and b) every household as well as public/community institutions using [a] safe technology option for disposal of faeces.*

**Safe technology option means no contamination of surface soil, groundwater or surface water; excreta inaccessible to flies or animals; no handling of fresh excreta; and freedom from odour and unsightly condition.*

Presently, there is an inadequate awareness and knowledge among PRIs about how to proceed with ODF Plus interventions (sustaining ODF and SLWM). These interventions include addressing and managing SLWM and bio-waste, faecal sludge, menstrual waste, plastic waste and greywater. Also issues of O&M of public and institutional toilets, water and sanitation financing, accessible sanitation aimed at the disabled etc. require attention. GPs and village level stakeholders need to know the options and activities for each of the above components and their specific roles and responsibilities.

Sanitation is a behavioural issue and its social acceptance and internalization by every user is crucial for sustaining ODF and adopting safe practices. Every person needs to make an effort towards sustaining ODF within their communities. GP/village level leaders are responsible for ODF Plus components being initiated in their areas. With functions, funds and functionaries (3Fs) being increasingly devolved to GPs for water, sanitation and hygiene (WASH) services, the roles of government departments/organizations (block, district and state) are largely that of enablers and facilitators. In this context, mobilizing communities for achieving ODF Plus through community-led approaches becomes non-negotiable. These approaches require the community to play a leading role in planning, implementing, monitoring and ensuring community ownership and commitment.

[1] NRDWP data as on 3 April 2019 and SDG India Index, Baseline Report, 2018

[2] SBM (G) website data as on 25/07/2019

[3] 'Open defecation (ODF) sustainability guideline' issued by Ministry of Drinking Water and Sanitation dated 15-12-2016;-Advisory on ODP Sustainability (ODF S) interventions issued by Ministry of Drinking Water and Sanitation dated 20-02-2018

[4] Definition of ODF by MDWS, 9 June 2015

The following section presents the benefits of sustainable water and sanitation services and key factors enabling and hindering water and sanitation services.

1.2 Health, economic and social benefits of sustainable water and sanitation services

The health and socioeconomic benefits of improved access to safe water and adequate sanitation have been acknowledged and accepted worldwide. Improved toilet coverage and water supply facilities have desirable impact on the social, economic and health conditions of the society.

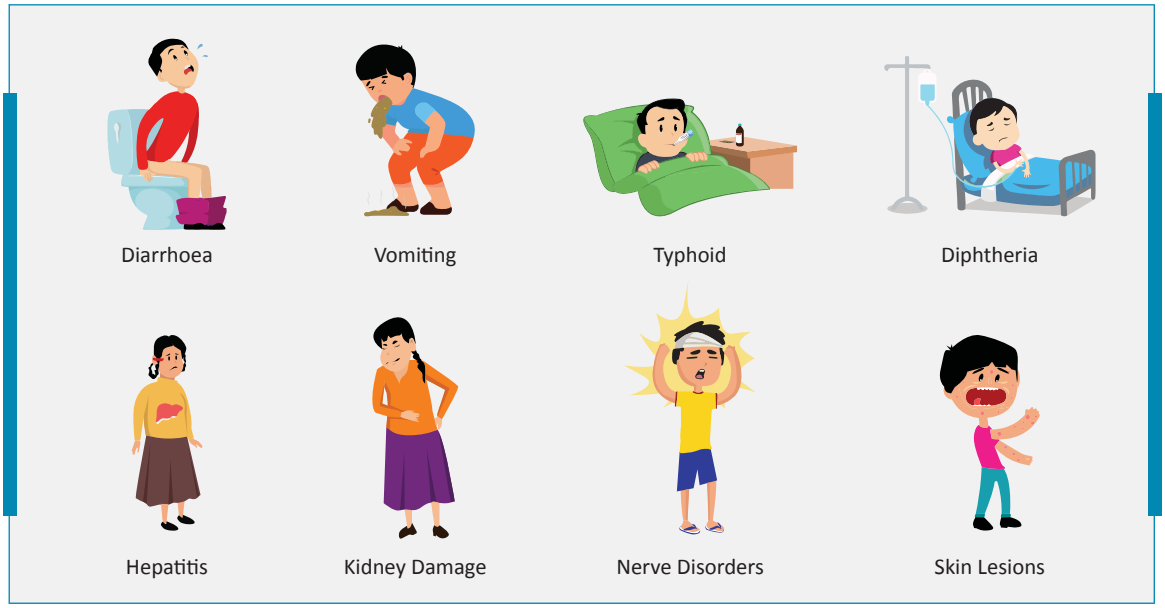
According to the National Annual Rural Sanitation Survey (NARSS) 2018-19,

- 93.1 per cent of households were found to have access to toilets
- 96.5 per cent of the people who had access to toilets used them
- 90.7 per cent of villages which were previously declared and verified as ODF were confirmed to be ODF. The remaining villages also had sanitation coverage of about 93 per cent
- 95.4 per cent of the villages surveyed found to have minimal litter and minimal stagnant water

The key health, economic, social benefits of sustainable water and sanitation services are:

Health benefits

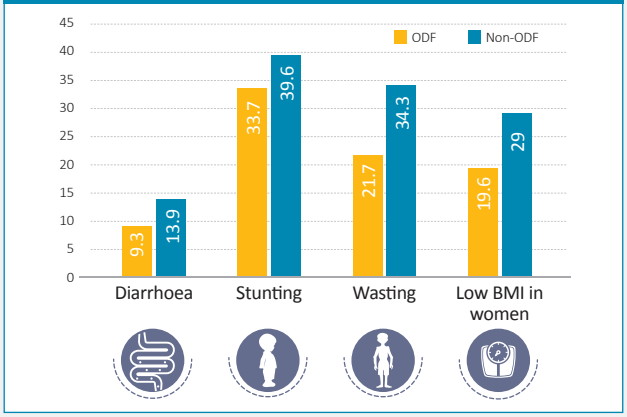
From the point-of-view of health, improving access to safe water supply and sanitation services is a preventive intervention. One of its key outcome is the reduction in the incidence of diarrhoea and consequently, a proportionate reduction in the number of deaths. According to UNICEF[5], diarrhoea caused deaths of 117,000 children annually and 39 per cent of children were affected by stunting in India. While reaching the ODF status meant significant progress for both indicators (stunting and deaths from diarrhoea), safe sanitation and drinking water supply can further improve the situation.



Case study: Health benefits

In order to assess the impact of sanitation programme on health status, a pilot study was undertaken in 2017 by the Bill and Melinda Gates Foundation (BMGF) in selected ODF and non-ODF districts. BMGF estimated that households in ODF villages in India have significantly better health indicators.

Performance of ODF and non-ODF districts in select health indicators (%), BMGF study



The non-ODF districts, having lower percentages of population with secondary education, reflected higher levels of diarrhoea, stunting, wasting Body Mass Index (BMI). These higher levels could also be attributed to negative or neutral attitudes of the village communities to sanitation. However, in ODF areas, with higher percentage of population with secondary education, there was a clear evidence of behavioural shift. The village health and sanitation committees (VHSC) had done significant work to eliminate open defecation in the respective villages. Moreover, a higher proportion of mothers of ODF areas were in the 'normal' BMI category (62.9 per cent) as compared to mothers of non-ODF areas (57.50 per cent) indicating that not only children, but mothers too, were healthier in the ODF areas.[6]

A study on potential health impacts of the SBM was conducted by the DDWS (of the then Ministry) and World Health Organization (WHO) in 2017/18. The study indicated that:

- *SBM-G will avert more than 3, 00, 000 deaths (diarrhoea and protein-energy malnutrition) between 2014 and October 2019.*
- *Unsafe sanitation caused an estimated 199 million cases of diarrhoea annually before the start of the SBM in 2014.The cases have gradually reduced, and will most likely be eliminated (when universal use of safe sanitation facilities has been achieved) by October 2019.*
- *More than 14 million Disability-Adjusted Life Years (DALYs) are estimated to be avoided (diarrhoea and protein-energy malnutrition) between 2014 and October 2019.*

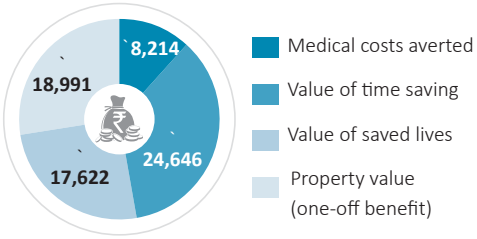
[5] UNICEF, 2016

6 https://jalshakti-ddws.gov.in/sites/default/files/BMGF_Health_Impact_Study_final.pdf

Case study: Economic benefits

Studies have documented that in addition to health benefits, communities also incur economic gains on becoming ODF. In a UNICEF supported study in 2018, improved sanitation was found to reduce economic losses associated with treating sanitation-related illnesses and to reduce income loss by increasing productivity. In addition, improved sanitation also leads to better utilization of time and effort. Travelling to distant toilets, inadequate sanitation facilities, lower product quality resulting from poor water quality, etc. reduce productivity. In the report, 'The Financial and Economic Impact of SBM in India (2017)' UNICEF estimated that a household in an ODF village in rural India saves 50,000 rupees/- ($800) every year, as compared to one in a non-ODF village.

Economic impact of sanitation



According to a World Bank estimate in 2009, the lack of sanitation facilities costs India over 6 per cent of her GDP.

International Monetary Fund (IMF) also studied the impact of SBM-G on productivity, and concluded that SBM (G) improved women's economic potential and led to a gain of 1.4 per cent in real GDP.

Case study: Social benefits

The main social benefits of improved sanitation facilities are improved privacy, convenience and social acceptance or social status. Improved facilities also help in avoiding the discomforts or dangers (e.g., snakes, pests, rain) of defecating in the open. Furthermore, for women, the provision of household sanitation reduces the risk of gender based attacks experienced when going to public latrines or outside to defecate. For adolescent girls, the provision of sanitation facilities in school means that they are less likely to miss school during menstruation.

1.3 Enabling factors and barriers for sustainable water and sanitation services

Enabling factors for sanitation	Enabling factors for drinking water
▸ Motivated and inspired village leadership and core group ▸ Desire for prestige and dignity ▸ Availability of water ▸ Unavailability of open spaces for defecation ▸ Increased awareness about the health impacts of open defecation ▸ Motivation by children ▸ Age of user ▸ Habit of, ownership of and aspiration for sanitation facility ▸ Toilets built through own funds or through self-motivation. Toilets with bathrooms result in good quality facilities that encourage usage ▸ Appeals and messages by influential leaders ▸ Involvement of the community (SHGs, youth groups, children, elected representatives, leaders, etc.) in promoting safe sanitation habits ▸ Community monitoring ▸ Promotion of sanitation by the Government ▸ Rewards and awards by the Government ▸ Individual convenience, comfort ▸ Strengthening of social norms that disapprove of open defecation	▸ Strong demand for water ▸ Motivated and inspired leadership ▸ Good quality construction of water supply facilities ▸ Efficient and dependable water supply services as per the norms ▸ Increased awareness about the benefits of consuming safe water ▸ Increased awareness among the community about its techno-financial status and processes ▸ Ownership and involvement of the community in planning and managing water services ▸ Appeals and messages by influential leaders ▸ Capable and competent institutions for regular O&M of water supply and water tariff collection ▸ Efficient grievance redressal mechanism is in place and responsive water management system ▸ Promotion and technical backing by the Government ▸ Rewards, awards and incentives by the Government

Barriers to sanitation	Barriers to drinking water
▸ Construction as per old designs ▸ Defunct toilets ▸ Unavailability of adequate water for sanitation ▸ Fear of the toilet pit getting filled ▸ Age of the user (small children and elderly avoid usage) ▸ Ignorance of safe management of children's faeces ▸ Reliance on single pits and no inclination towards constructing better latrines ▸ Inadequate/not well-maintained institutional toilets ▸ Habit of defecating in the open ▸ Inadequate O&M of toilets ▸ Inadequate systems for septage management ▸ Less community participation and monitoring ▸ Lack of social norms disapproving of open defecation ▸ Women not involved in management or decision-making with regard to sanitation issues	▸ Inadequate participation of the community in planning, implementation and monitoring of water supply schemes ▸ Lack of clarity on roles and responsibilities of village stakeholders for effective management of a water supply scheme ▸ Inadequate capacity of GP functionaries in technical and financial management of water supply systems ▸ Lack of focus on measures for source sustainability leading to a failure of sources ▸ Lack of adequate O&M leading to dysfunctional systems ▸ Water quality issues plaguing the system ▸ Inadequate knowledge of how water affects health ▸ Lack of knowledge regarding water quality, treatment and safety. No information about household-level water treatments ▸ Drinking water contamination due to inappropriate handling of water during collection, transportation, storage and use ▸ Lack of awareness about constitutional right to safe water ▸ Absence of community participation and ownership in the management of facility ▸ Poor electricity supply in remote areas, thereby affecting drinking water supply

Programme strategies and capacity-building interventions are informed by an understanding of the WASH sector. The strategies and interventions are designed according to the enablers of sustainable services and address the barriers that hinder these services.

1.4 SDG and present Government policy and programmes for water and sanitation in rural India

The Millennium Development Goals (MDGs) started a global movement in 2000 to fight poverty and hunger, gender inequality, environmental degradation, and HIV/AIDS. Sustainable access to safe drinking water and basic sanitation was a crucial goal under the MDGs. Built on the success of the MDGs, the Sustainable Development Goals (SDGs) moved a step ahead of 'access to improved water and sanitation facilities' by focusing on sustainable and safe water and sanitation management.

The SDGs are the blueprints for achieving a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity and peace and justice. The Goals interconnect as well. A set of 17 goals for the world's future was agreed upon by all countries.

Goal 6: 'Clean water and sanitation'

6 CLEAN WATER AND SANITATION

Target 6.1 Drinking water

By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.1.1: Population using safely managed drinking water services

Definition: Population using an improved drinking water source which is:

- located on premises,
- available when needed, and
- free of faecal and priority chemical contamination

Target 6.2 Sanitation

By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.2.1: Population using safely managed sanitation services, including a hand washing facility with soap and water

Definition: Population using an improved sanitation facility which is not shared with other households, and where excreta is either:

- safely managed in situ, or
- safely removed and treated off-site

As per the SDG Goal 6, the following targets are also set:

- By 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reusing technologies
- Support and strengthen the participation of local communities in improving water and sanitation management
- By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of fresh water to address water scarcity and substantially reduce the number of people suffering from water scarcity
- By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

India is committed to the SDGs to ensure adequate availability and sustainable management of safe water and sanitation for all. For achieving sustainability, the sector has adopted demand driven community centric policies in lieu of heretofore supply-based approaches. Implementation of demand-led community-driven programmes like SBM (G), JJM and Swajal has given the sector the much-needed push and impetus towards universal coverage. It has also helped in decentralizing water and sanitation programmes in India.

The Government aspires to make every village a Sujal and Swachh Gaon, which means that every GP and village will have safe and secure drinking water supply and management systems (covering elements of source sustainability, water quality monitoring and surveillance and O&M of systems), sanitation infrastructure at individual, institutional and public levels(which will be regular maintained and repaired), and effective waste- management systems. The waste management systems should be capable of treating faecal sludge (FSM), plastic waste, biowaste, liquid waste (greywater) (LWM), etc.

The chapters in this resource material discuss specific strategies and activities required to implement each of the above components of the *Sujal and Swachh Gaon.*

References for further reading

- Guidelines on ODF S issued by the MDWS on 15 December 2016
- Training manual on sustainable sanitation developed by UNICEF and the MDWS
- Training manual on ODF S under SBM (G) developed by the Water and Sanitation Department, Government of Maharashtra
- Guidelines on ODF verification issued by the MDWS on 3 September 2015
- Advisory on ODF sustainability issued by the Government of India on 20 February 2019

CHAPTER 2

CONCEPT AND COMPONENTS OF SUJAL AND SWACHH GAON

Key discussion points

- Concept, features and components of *Sujal and Swachh* Gaon
- Role of village stakeholders in creating *Sujal and Swachh* Gaon

After achieving significant progress in the water and sanitation sectors, the Government is moving towards creation of '*Sujal and Swachh* Gaon'.

2.1 Concept and features of Sujal and Swachh Gaon

A Sujal and Swachh Gaon is one in which:

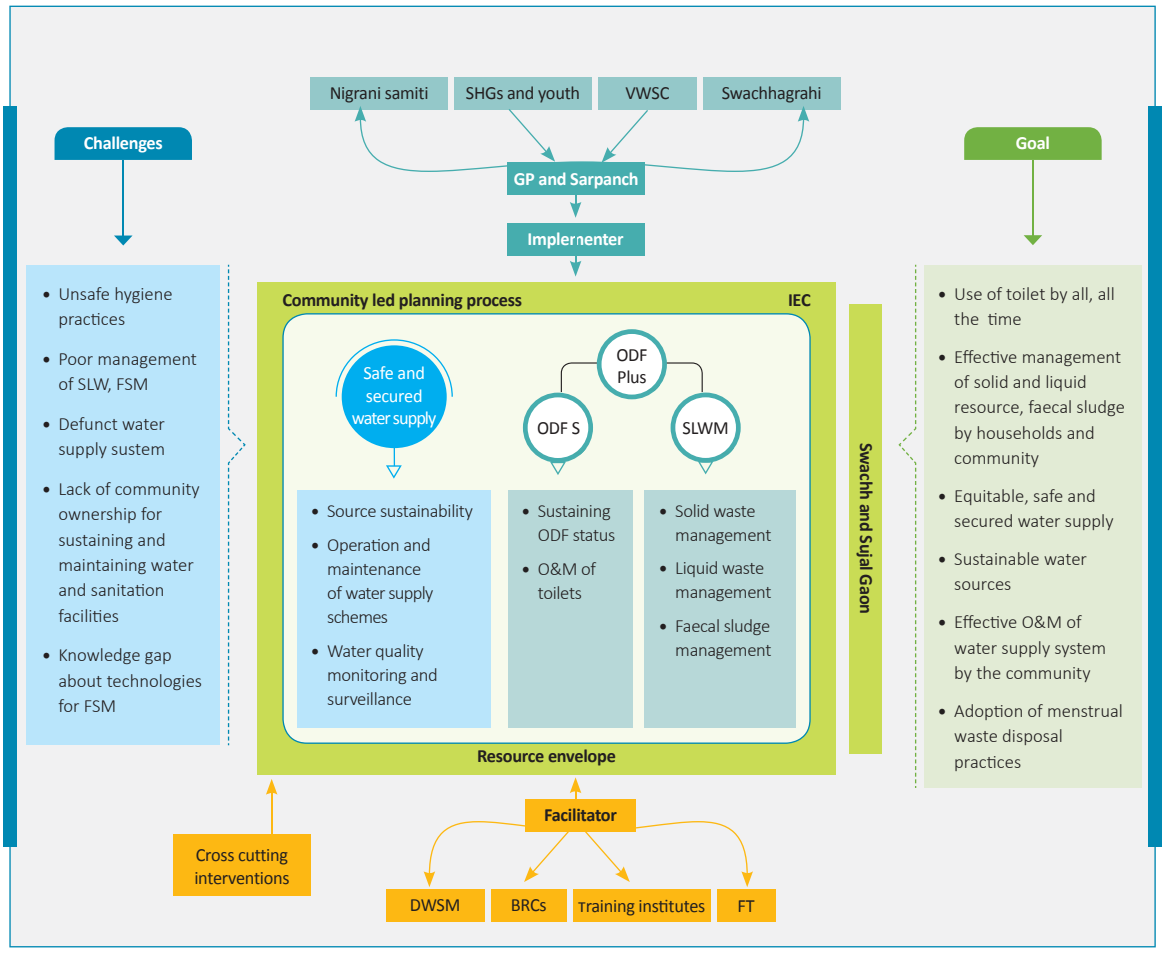
- Sustainable and good quality water and sanitation facilities have been developed
- Community ownership towards maintaining and sustaining water and sanitation facilities has been established
- Every household is supplied with equitable, safe and secure water for drinking and domestic purposes
- The drinking water sources are protected from contamination and households practise safe handling and storage of drinking water
- Conventional and non-conventional measures have been implemented for the sustainability of drinking water sources
- Every household in the community pays water tariff as has been mutually decided upon, keeping equity in mind and the GP is financially capable of effectively managing operation and maintenance of water supply systems
- Each and every member of the community regularly uses only toilets for sanitation purposes

- Institutions have the capacity for appropriate faecal sludge management and solid liquid waste management
- Adolescent girls and women between the ages of 14 and 45 have access to safe menstrual waste management practices in an enabling environment at the household and community levels

2.2 Components of Sujal and Swachh Gaon

Diagram 2.1 explains the concept as well as the components of Sujal and Swachh Gaon. In the schematic, the key challenges to rural water supply and sanitation are listed. In addition, the implementers and facilitators of the sanitation and water supply systems are mapped. Based on this analysis, interventions required for Sujal and Swachh Gaon creation are prioritized. These interventions are of three types: (i) safe and secure drinking water supply and management; (ii) ODF Plus: ODF-S and SLWM and (iii) cross cutting interventions like convergence, IEC, action planning, etc. These interventions together will help transform villages into *Sujal and Swachh* Gaon.

Diagram 2.1 Sujal and Swachh Gaon



A. Safe and secure drinking water supply and management

Safe and secure drinking water supply and its management is a crucial component of the Sujal and Swachh Gaon. To ensure safe and secure drinking water supply, it is important to focus on following three major aspects:

A1. Source sustainability: Strengthening of available drinking water sources to deliver adequate quantity of water for drinking and domestic purposes and encouraging judicious use of water. The following activities need to be carried out for source sustainability.

i. Drinking water budgeting

- Estimation of the requirement of drinking water and the availability of drinking water from all sources
- Water conservation initiatives through various conventional and non-conventional initiatives

ii. Water source augmentation measures

- Bore well recharging
- Rainwater harvesting
- Groundwater recharging and similar other interventions
- Basic treatment and reuse of greywater

A2. Provision of PWS to HHs using household connections: The JJM programme which is now being launched, aims to provide every rural household with a 'functional household tap connection' within its premises. It will ensure adequate supply of safe water for drinking, cooking and other domestic basic needs on a sustainable basis. The key components of the scheme are (i) functional household tap connection, (ii) source sustainability, (iii) greywater management and (iv)operation and maintenance. For effective implementation of this scheme, GPs have to (a) provide land for the identified category of the scheme, (b) organize participatory rural appraisal (PRA) activities for the finalization of options and (c) commit to taking responsibility post-construction for effective O&M of the scheme.

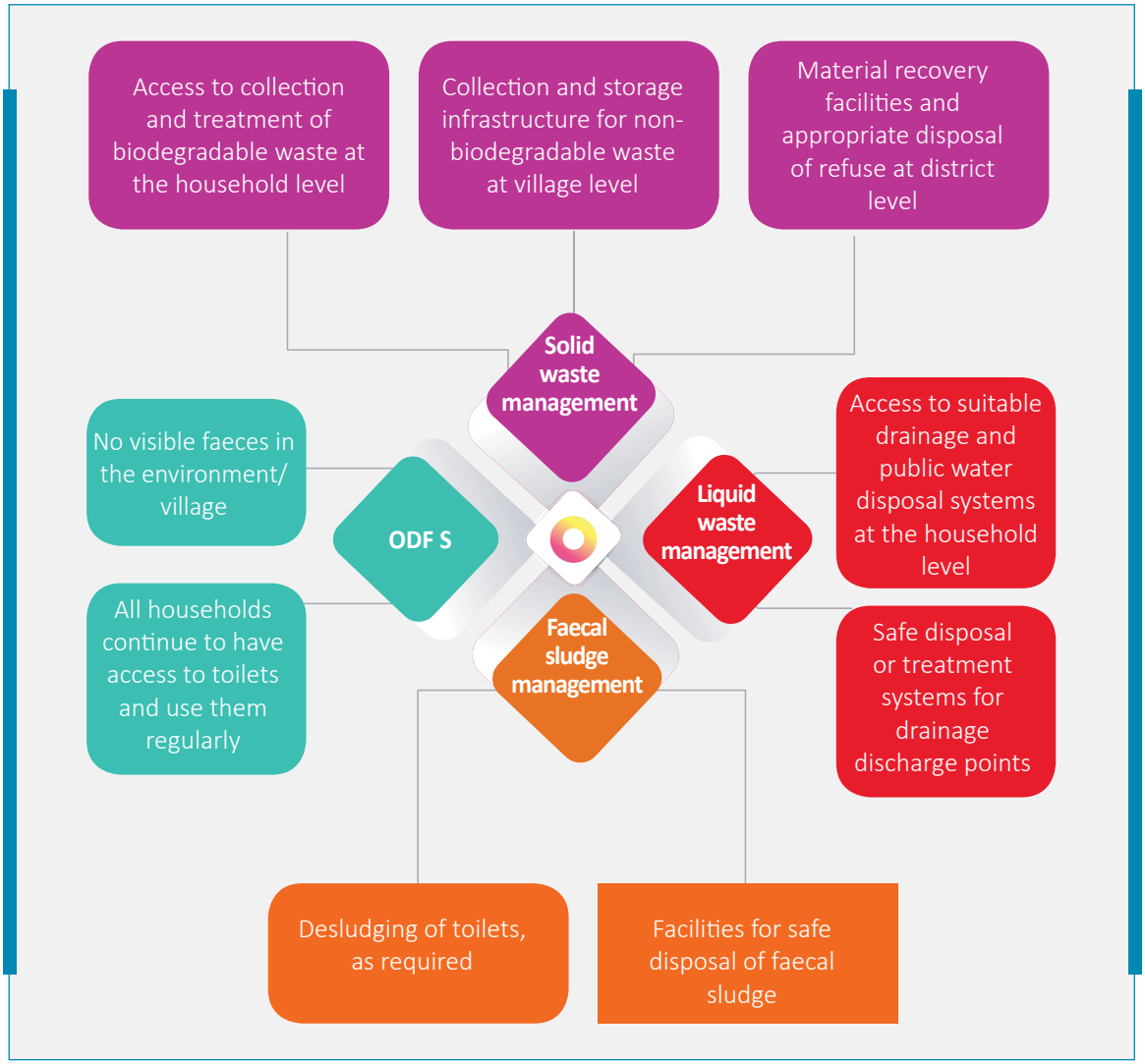
A3. O&M of water supply systems: Apart from strengthening the sources and developing water supply systems, O&M of water supply facilities is of fundamental importance. For this, it is necessary to understand the technical, financial and institutional issues in O&M of all types of water supply systems: piped water, tube well, handpump etc. Similarly, community ownership and its ability, willingness of individuals to pay while keeping equity in mind, and the availability of three Fs (funds, functions and functionaries) to maintain systems are also vital for scheme sustainability.

A4. Water quality monitoring and surveillance: Water quality monitoring and surveillance is an important intervention essential for ensuring water safety. For safe water supply, activities like protecting water sources and systems from contamination, regular disinfection of water storage units, water quality testing, sanitary survey of water sources, taking remedial actions in case of a fault, and familiarizing families with methods of safe water handling and storage of water in households, need to be carried out at the village level.

B. Open defecation free plus (ODF Plus)

A village may be considered ODF Plus compliant if it is able to sustain its ODF status and safely manage its solid and liquid waste including faecal waste. The key guiding principles for ODF Plus which need to be considered at the village level while handling issues of waste management and disposal are:

1. Use/rejuvenation/ upgradation of existing infrastructure, as applicable, to be prioritized.
2. To achieve the goal of ODF Plus in a cost-effective manner, the 3Fs that exist for other programmes may be utilized through appropriate convergence mechanisms.
3. For creation of new assets, individual assets to be encouraged and prioritized. Efforts should be made to develop community assets and financial provision in order to realize new asset creation. This will help to achieve comprehensive management of solid and liquid waste at the village level.
4. Activities that promote 'reduce, reuse and recycle' approaches should be promoted.
5. Technologies incurring the least O&M cost should be encouraged and selected for adoption, so that management can be done at GP/village levels.
6. Technologies best suited to the hydrogeology and topography of the areas may be chosen.



7. For the disposal of waste, villages should be clustered as per suitable criteria such as transport distance, time to the local market/urban centre etc. Cluster level resource collection or processing centres to be set up so that economies of scale can be achieved.
8. For villages with populations more than 2000, storage sheds for non-biodegradable waste, drains for conveyance of wastewater and waste stabilization ponds or other large scale treatment technologies can be constructed.

Considering these guiding principles, following components need to be focused on while planning for ODF Plus.

B1. ODF S: For ODF Sustainability, no human faeces should be visible in the environment/village and all households should have sustained access to functional toilets, which are used by all members regularly. Sustainable sanitation can be ensured by augmenting sanitation facilities and making people aware of the need to use and repair toilets regularly. Building capacities of the GP for effective O&M of sanitation facilities (this would also ensure decentralization of sanitation programmes) and regular monitoring of the status are also important. To achieve sustainable sanitation, the following activities need to be considered-

- Continued functionality of the assets created under SBM (G)
- Ensuring good hygiene practices for the community through active community monitoring mechanisms (using IEC and IPC tools) and continuous usage of toilets
- Sustaining the ODF status of villages, GPs, Blocks and Districts
- Maintenance of institutional and public toilet facilities
- Developing system for preventive and corrective maintenance
- Developing environmentally safe faecal sludge management (FSM) systems
- Capacity-building interventions for personnel and stakeholders engaged in the ODF S
- Moving towards ODF Plus- generating awareness of effective solid liquid resource management
- Prioritizing ODF villages for other development programmes like piped water supply schemes

B2. Solid waste management: This mainly comprises efficient use of appropriate technologies/ expertise for management of solid waste. For this, the ODF village needs to focus on the application of 4 Rs (reduce, recycle, reuse and recover) and other suitable interventions for effective management of biodegradable, plastic, menstrual and other categories of waste.

B3. Liquid waste management For efficient management of liquid waste in the GP, functionaries need to undertake activities promoting on-site treatment of greywater, providing access to suitable drainage and public water disposal systems and setting up safe disposal or treatment systems for drainage discharge points, like soak pits and magic pits. Basic treatment is also very important for the re-use of greywater.

B4. Faecal sludge management: The GPs need to focus on effective FSM by emptying pits, desludging toilets as required and creating facilities for the safe disposal of faecal sludge.

C. Cross cutting interventions for Sujal and Swachh Gaon

The cross cutting interventions for *Sujal and Swachh* Gaon are:

C1. Resource envelope for water and sanitation facilities: Gram panchayats will require funds and human resources for implementation of various activities under this initiative. Activities may include developing/repairing of water and sanitation infrastructure at individual, community and institutional levels, as required. Funds and Human Resources (HR) available under SBM may not be adequate for this, and hence there may be a need to converge schemes of various departments, so that additional funds can be availed of, and other resources can be mobilized as required. Convergence, therefore, is one of the most important interventions in the process of creation of Sujal and Swachh Gaon. In addition, other options of finance like Swachh Credit will also need to be mobilized for interventions.

C2. IEC: IEC is an important tool for adoption of safe hygiene practices and behaviour regarding water and sanitation. Further, capacity-building is helpful to develop knowledge and skills of implementers in the creation of Sujal and Swachh Gaon. IEC and capacity-building are therefore important tools and should be applied at all levels.

C3. Community-led action planning process: The most important process for ensuring sustainability of water and sanitation facilities is to mobilize the community into creating a Sujal and Swachh Gaon. Planning and implementation of water and sanitation facilities should be carried out at the community level. Community-led action planning is one of the most important participatory tools which helps the community in finalizing interventions, and promoting ownership. It also helps in mobilizing communities to implement measures and sustain the outcomes.

2.3 Role of village stakeholders in creating a Sujal and Swachh Gaon

The sarpanch, gram panchayat members, nigrani samiti, swachhagrahis, ASHAs and anganwadi centres (AWCs), Jal Sahiyas, pump operators, etc. are the key implementers of water and sanitation programmes at the village level. In the spirit of decentralization, as per the Seventy-third Constitutional Amendment, the provision of drinking water and sanitation, which is included in 29 functions of the XIth schedule, is entrusted to panchayats. Ensuring availability of safe and secure water and sanitation facilities for all villagers throughout the year is the prime responsibility of the GP. Hence, it is necessary that the Sarpanch, elected representatives and other stakeholders of GP are made well conversant with their duties and responsibilities in ensuring safe and adequate water and sanitation facilities on a sustained basis.

The vision of the Sarpanch along with her/his dedicated efforts has a huge impact on the development of the village infrastructure and community. The Sarpanch can enhance and sustain the provision of drinking water and sanitation services only if the he/she is aware of people's needs and undertakes a participatory and inclusive decision-making process. The Sarpanch has to understand and support community action for safe water and sanitation and sensibly monitor the performance of the service delivery. Working towards the creation of a 'Sujal and Swachh Gaon' allows a Sarpanch to augment his/her leadership qualities, involve every member of the community and meet water and sanitation demands of all in the village.

Specific role of the Sarpanch and other village stakeholders in the creation of a Sujal and Swachh Gaon:

- Address water supply and sanitation needs of each household of all habitations and of itinerant populations by carefully monitoring the performance of existing facilities and estimating the need for augmentation of new facilities.
- Involve all sections of the community including women and marginalized communities in the planning of new schemes and augmentation of existing services.
- Involve all sections of the community including women and marginalized communities and ensure that their water and sanitation needs are addressed.
- Include provisions regarding water and sanitation facilities of the community in the priority list of Gram panchayat Development Plan (GPDP) activities and mobilize resources to fulfil the demand.
- Assess the status on issues relating to general cleanliness of the GP/village, protection of water sources, coverage of toilets and their use and solid and liquid waste management and take necessary steps to augment services.
- Ensure functionality of institutional toilets and water availability in schools, anganwadis, health centres, panchayat offices and in public places like markets and bus stands.
- Establish/strengthen VWSCs, nigrani samiti and encourage the VWSC/ village team to participate in management, capacity-building and IEC activities targeted at all concerned stakeholders motivate the community towards collective action in the creation and maintenance of water and sanitation facilities. The stakeholders should encourage the people of a community to:
    - Take collective action in the creation and maintenance of water and sanitation facilities
    - Use toilets regularly and not defecate in the open
    - Use water judiciously and avoid wastage
    - Adopt safe water storage, handling practices and personal hygiene
    - Protect water sources and water and sanitation facilities and participate in its maintenance
    - Pay water and sanitation service taxes and user charges as determined by the community/ GP and in time
    - Participate in *Shramdaan for* water and sanitation-related activities
    - Promote the use of soak pits, composting and kitchen garden for managing solid and liquid waste at the household level
    - Participate in Gram Sabhas regularly and actively, raise issues and participate in discussions on water and sanitation services

The stakeholders should also:

- Initiate the selection of village level functionaries to work on water and sanitation (swachhagrahis/ barefoot technicians), coordinate their capacity-building and regularly review their performances

- Review and maintain prescribed books of account, audit procedures and transparency in water and sanitation projects and schemes

It is important to develop leadership skills and to build capacities of relevant stakeholders to organize all the various activities. Gram panchayat has a central role in creating Sujal and Swachh Gaon. Similarly, the community's capacity to manage and monitor water and sanitation facilities is also crucial in moving towards a Sujal and Swachh Gaon.

Gram panchayats need technical and facilitation support in the implementation of various activities for sustainable management of water and sanitation facilities. The DWSM, BRCs, and various facilitators have to play an important role in the process of facilitation and building capacity of stakeholders at the gram panchayat level. Facilitators are required to support gram panchayats, nigrani samitis, swachhagrahis and other stakeholders during village level planning and implementation processes. They should also help the stakeholders in IEC activities, resource mobilization efforts and developing community monitoring systems.

References for further readings

- ODF Booklet, Department of Drinking Water and Sanitation
- ODF Sustainability and ODF Plus, A Training Manual for Sustainable Sanitation Swachh Bharat Mission (Grameen), by the Ministry of Drinking Water and Sanitation.
- Infrastructure and Investments in Water and Sanitation in India
- Training manual on ODF S under SBM (G) developed by Water and Sanitation Department, Government of Maharashtra
- Guideline on ODF verification issued by MDWS on 3 September 2015
- Guideline on ODF S issued by MDWS on 15 December 2016
- Advisory on ODF sustainability issued by the Government of India on 20 February 2018.

CHAPTER 3

INTRODUCTION TO THE JAL JEEVAN MISSION PROGRAMME

Key discussion points

- Introduction
- Key programme components
- Functional household tap connections
- Eligibility criteria for gram panchayats for JJM schemes
- Role of gram panchayats in implementing mandatory source sustainability and greywater management components
- Need for community participation and ownership

3.1 Introduction

The Jal Jeevan Mission (JJM) aims to provide every rural household with a 'functional household tap connection' (within its premises) that can provide an adequate amount of safe water for drinking, cooking and other domestic basic needs on a sustainable basis. This basic requirement must meet water quality standards and be readily and conveniently accessible at all times and in all situations.

GoI has launched the JJM to fulfil the aspiration of and demand for household (HH) tap connections. This will significantly improve the quality of life, particularly that of women and children, and assist in ODF Sustainability (as water is important to sustain sanitation achievements).

The traditional method of supplying rural areas under the National Rural Drinking Water Programme (NRDWP) had a number of challenges, such as limited scope of water conservation measures, limited community ownership etc. The challenges can now be addressed through the JJM programme.

7 As defined by Census 2011 document: Premises means building along with the land and/or common places attached to it.

3.2 Key components of the JJM

The four key components of JJM are:

1. Functional household tap connection, within premises, for every rural HH, with water supply of 55 litres per capita per day (lpcd). All public institutions (schools, anganwadis, health centres) to have access to safe and adequate drinking water
2. Mandatory source sustainability measures like borewell recharge structures, rainwater harvesting, etc.
3. Mandatory greywater management measures like soak pits, waste stabilization ponds, etc.
4. Mandatory community ownership by users/ GPs

3.3 Functional household tap connections

Under the NRDWP, the primary effort was to supply water to various settlements predominantly with a stand-post and/or hand pumps through Single Village Schemes (SVS) or Multi Village Schemes (MVS). An SVS, as the name suggests, is usually a single village groundwater based community-managed scheme. An MVS is usually a surface water based scheme that caters to multiple villages and is usually managed by an implementing agency.

- The SVS will be taken up where there is a sufficient quantity of groundwater available and the groundwater is free from prior chemical contaminations (fluoride, arsenic, nitrate, iron and salinity).
- The Central Groundwater Board (CGWB), based on the analysis of its data, identified a list of Q (quantity) and Q (quality) blocks, which have groundwater in sufficient quantity and of the desired quality. MVS will be taken up only in those blocks which do not fall under Q&Q blocks.

The GPs will be involved in the entire process of planning, implementation and monitoring as the JJM- is a community-owned and community-managed programme. The district administration will support and technically assist the GPS in identifying the category of schemes suitable for them and in providing HH tap connections

3.4 Eligibility criteria for gram panchayats

The following three criteria must be met by the GP to be eligible for a JJM scheme:

1. Land provision for the scheme:

- The GP may provide land for the identified category of Scheme and submit a GP resolution along with a map indicating the survey number of the land thus identified

  (Note: land to be identified in consultation with the implementing agency)

2. Participatory rural appraisal (PRA) activities:

- PRA activities with the community are mandatory for a SVS to consider the local requirements.

  (Note: PRA activities like social mapping, resource mapping, water budget, seasonality, scheme transect, option selection meeting, etc.)

3. Community contribution:

- Mandatory household contribution
- The GP has to take up maintenance of all SVS and MVS infrastructure within the GP
- Identify, train and pay a 'water person' who will manage and maintain the water systems, collect user fees and appraise the panchayat on any issues

  (Note: A separate account for O&M charges has to be opened and the amount has to be deposited in it. The implementing agency will support the GP in calculating the O&M costs.

JJM has a competitive approach and hence the GPs which meet the eligibility criteria first will be given the scheme at the earliest on a first-come-first-serve basis.

3.5 Role of gram panchayats in implementing mandatory source sustainability and greywater management components

The main role of GP would be to drive convergence efforts and use funds and resources from other schemes like the MGNREGA, the fourteenth Finance Commission and the State Finance Commission to enable the implementation of the following mandatory source sustainability and greywater management components.

- Rooftop rainwater harvesting structures in all public institutions
- Bore well recharge structures for bore wells that are selected to provide drinking water
- Community soak pits
- Drainage channels
- IEC interventions like wall writing/painting, street dramas etc to promote water conservation behaviour

  (Details of Source sustainability, greywater management are covered in the following chapters)

3.3 Need for community participation

The JJM programme envisages community participation and ownership at all stages of the programme roll out. Following are the key areas in which community participation is foreseen:

- Participatory planning for the scheme through PRA
- Availing household water connections by paying the necessary connection charges
- Timely payment of monthly water charges
- Effective management of greywater
- Adoption of safe water storage facilities/ infrastructure and hygiene practices
- Community monitoring of O&M of the schemes
- Use of soak pits, composting and kitchen garden etc. for managing solid and liquid waste
- Taking up rooftop rainwater harvesting system
- Participation in shramdaan and other voluntary contributions for source sustainability activities

SECTION 2

SAFE AND SECURE WATER SUPPLY AND MANAGEMENT

- Drinking Water Availability and Demand in Villages
- Source Sustainability
- Operation and Maintenance of Water Supply Systems
- Water Quality Monitoring and Surveillance

CHAPTER 4

DRINKING WATER AVAILABILITY AND DEMAND IN THE VILLAGE

Key learning points

- Introduction
- Key actions for source sustainability and augmentation
  - Drinking water budgeting
  - Source sustainability measures
  - Source augmentation measures
- Community mobilization and contribution/ shramdaan for water conservation
- Roles of Sarpanch, swachhagrahi and gram panchayat in source sustainability

4.1 Introduction

Most of the rural water supply systems are groundwater based. Therefore, existence of dependable sources throughout the year is crucial for making sufficient quantities of water available in all seasons. Similarly, judicious use of available water and water conservation measures are important to ensure water security. Many villages in the country face water scarcity in summer months and nowadays, often throughout the year. Ensuring sustainability of sources by effectively managing the demand and supply of water is of the utmost importance at this juncture.

Inspired by the Hon'ble Prime Minister's impetus on Jal Sanchay, the GoI has launched the Jal Shakti Abhiyan (JSA) to revive traditional conservation methods of India and establish a sustained system of water conservation. The Abhiyan aims at making water conservation a Jan Andolan through administrative push, new asset creation, effective utilization of existing assets and focused communication campaigns.

In many villages, water supply schemes are defunct due to over-extraction, a significant decline in the groundwater table and the failure of water sources. The main reasons for source failure are: The groundwater reduces when the recharge is lesser than the discharge. This source failure is often seasonal, usually occurring during the summer months. Sometimes decrease in the groundwater level can also lead to permanent failure of water sources.

- Ever-increasing demands that persistently exceed available supplies
- Increased water consumption due to population and economic growth
- Over-exploitation of groundwater mostly to meet the demands of irrigation
- Limited local knowledge about conventional and unconventional techniques for recharging the groundwater
- Poor community- participation in implementation of measures aimed at increasing the local water level

> ***My first request is that just like cleanliness drive has been given the shape of a mass movement by the countrymen; let's also start a mass movement for water conservation. We together should all resolve to save every drop of water and I believe that water is God's prasad to us, water is like philosopher's stone!***
>
> Hon. Shri Narendra Modi,
> Prime Minister of India,
> Mann ki Baat, 30 June 2019
>
> *(Reference: Jal Shakti Abhiyan, Kunjika for Swachhagrahis, Ministry of Jal Shakti)*

Managing and sustaining village water safety and security is a dynamic process. For continuous water supply, one time capital investment in infrastructure is necessary but not adequate. Therefore, specific interventions need to be taken for source sustainability, optimal use and management of water sources. Source sustainability comprises assessment of the amounts of water available through various sources and taking actions to strengthen the sources. It also includes preparing a water budget consisting of an analysis of demand and supply of water.

4.2 Key actions for source sustainability and augmentation

A source can be considered sustainable when it delivers the desired quantity of safe water in all seasons. Primarily, there are two sides to source sustainability: (i) supply-side issues and (ii) demand-side issues. For the fulfilment of domestic water needs, availability of sustainable water sources with adequate yield (in the village) needs to be ensured. For this, an assessment of the amount of water supplied through various sources and interventions to strengthen these sources is important. Similarly, preparing a village level water budget, consisting of demand for (drinking and domestic use) and supply of water from all available drinking water sources is necessary to decide on interventions from the demand and supply perspective. Therefore, to ensure safe and secure drinking water supply, emphasis on both the supply and demand sides is necessary.

Supply-side factors include geological formation, aquifer parameters, rainfall quantity and intensity, topography and land-use patterns. There are natural boundary limits for supply of groundwater which can be modified through interventions in a limited manner. These supply-side interventions mainly comprise groundwater recharge interventions which include conventional and unconventional techniques. These interventions aim at enhancing groundwater recharge and improving groundwater levels.

The demand-side factors are primarily linked to controlling water demand and the usage pattern. Overall contribution of the demand management measures is much higher than the supply-side interventions. Therefore, it is imperative to design and implement demand management measures well.

Earlier experiences of Groundwater Survey and Development Agency (GSDA) of Maharashtra, have shown that supply-side interventions increase the recharge of groundwater by 1.47 per cent to 2.47 per cent of the total annual groundwater recharge, while demand management measures can save groundwater by 20 per cent to 33 per cent of the same.

4.2.1 Drinking water budgeting

Water Budget is a tool used for calculating the demand and supply of water. Preparation of water budget is also helpful to understand whether water is deficit or in surplus in a particular village. This further helps to finalize adequate measures for the demand and supply sides of water management. While preparing water budget, it is necessary to consider the following steps:-

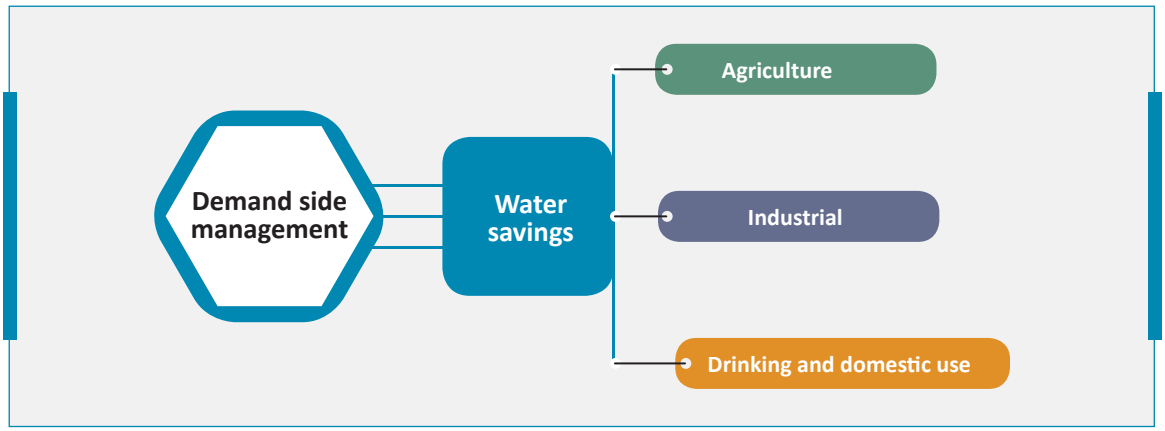
- **Water demand estimation:** The first step in water budgeting is calculating the demand for water. During the preparation of the budget, the requirement for both drinking and domestic needs should be considered. Multiplying the water consumption norms with the village population determines the drinking and domestic water requirement.
- **Water availability estimation:** After the calculation of water demand (requirement), water available from various sources in the village needs to be considered. Water available from safe hand pumps, tube wells, dug wells etc. should be calculated. The formats for calculating water budget are attached as Annexure 1.
- **Water budget:** The difference between the demand for water and the total amount of water available is called the water budget. The water budget of a village depicts whether there is a water deficit or surplus water in a particular village. Accordingly, the GP can decide and implement methods to either increase water availability or decrease demand. Planning should therefore be done with community participation and water budget should be prepared and implemented every year.

4.2.2 Water demand management

Water is mainly used for drinking, domestic, agriculture and industrial purposes. About 85 per cent of the groundwater is used for agriculture. Thus, there is a need for efficient use of water for agricultural purposes and prudent use of water for drinking and domestic purposes.

For effective demand-side management, water saving irrigation techniques such as drip, sprinkler, etc. should be promoted at the community level. Awareness should also be generated through IEC and IPC activities, about appropriate use of water for drinking and domestic purposes at the household level. Competitions for the prudent use of water can be held at the gram panchayat

level and those households practising safe handling and storage of drinking water or managing liquid resource at the HH level can be awarded.



4.2.3 Water conservation measures

For supply-side management, there is an urgent need for encouraging rainwater harvesting, replenishing the existing surface water bodies, creating new ones and recharging the groundwater. There are various conventional and unconventional techniques that can be used for supply-side management. These include:

Conventional techniques	Unconventional techniques
▸ Check dams/ cement plug ▸ Injection wells ▸ Gabion structure ▸ Groundwater dams or subsurface dykes or underground *bandharas* ▸ Farm ponds ▸ Gully plugging ▸ Contour bunding ▸ Percolation tanks	▸ Fracture seal cementation (FSC) ▸ Bore blast technique (BBT) ▸ Stream blasting ▸ Jacket well ▸ Hydro-fracturing ▸ Recharge shaft

A. Conventional measures

These are common methods practised in the field. They collect water in a conventional way on the upstream side of the source so that the run-off velocity is reduced, and the stored water recharges the groundwater source. Some of the most common conventional measures for source sustainability are:

Conventional measures

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Loose boulder structure/gully plug 	Boulder checks or gully plugs are loose boulder structures made on small drainage lines or seasonal streams. Objectives: ▸ Control the flow of rainwater and prevent soil erosion ▸ Enhance the infiltration of surface run-off into the groundwater system ▸ Increase the duration of flow in the drainage line to raise the groundwater table	The construction of gully plugs is done with the use of local stones, clay soil and shrubs in small channels and streams that flow through small catchments on the slope of the mountains. Bigger boulders are placed outside and smaller ones inside. The biggest boulders are placed on the downstream side. The maximum height of the structure should be 1m.	▸ Minimum sedimentation in the storage basin, less run-off and reduced velocity ▸ Stops soil erosion, favourable soil- moisture condition in nearby fields ▸ Delayed discharge/ the flow period helps in groundwater recharge ▸ Lower cost of structure, economic design, longer life, less risk of damage ▸ Sustainability of the structure can be achieved easily	▸ They are loosely constructed structures and can be destroyed in flash floods of high intensity ▸ One damaged structure on the upstream side may damage the structure immediately below it ▸ Need of maintenance work before every monsoon

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Gabion structure 	▸ Gabion structures are rock and wire dams constructed across drainage lines in catchment areas. Objective: Similar to that of loose boulder and gully plugs	After selecting the area, sand is layered on the trench channel. Then a net is spread on it followed by layering of boulders on it. One drain is constructed on one of the sides of the gabion structure to prevent water overflow.	▸ It can be constructed where earthen dam or cement dams are uneconomical ▸ It can be constructed on streams of high to medium velocities of water ▸ It can sustain medium intensity flash floods ▸ Local material can be used	▸ Over the period the bund gets silted and de-silting is required ▸ The pressure of large volumes of water may damage the wire mesh
Check dams/ cement plug 	Check dams are constructed across small streams having gentle slopes and are feasible in both hard rocks as well as alluvial formations. Objective: To arrest the maximum run-off of water from streams	Normally, the dimensions of the Nala bund are: length 10 to 15 metres, height two to three metres and width one to three meters, generally constructed in a trapezoidal form. If the bedrock is highly fractured, cement grouting is done to make the foundation leakage free. Dam foundation must be of solid impermeable rocks with no soil pockets or fracture lines.	▸ Impounding of water helps the water, which may otherwise flow away, to percolate into deeper layers of the soil profile. by High velocity run-off water may lead to soil erosion, silting its natural course and downstream structures. ▸ Quantity of water accumulated is favourable for deeper infiltration. ▸ Retention of water for longer time. It helps large quantities of water to percolate	▸ Large structure requires more space ▸ There may be problem of land-acquisition ▸ De-silting is required every three to four years ▸ Civil engineering expertise is required

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Groundwater dams or subsurface dykes or underground bandharas 	These are basically groundwater conservation structures and are effective in providing sustainability to groundwater structures by arresting subsurface flow. Objective: To arrest the flow of groundwater out of the sub-basin and increase the storage within the aquifer	Underground bandharas can be constructed with soil or cement. In the case of soil bandhara, however, excavation across the stream has to be done up to the hard strata. Bottom width has to be designed so that the depth of excavation is up to the hard strata. This depth is normally found to be 3–4 m.	▸ The impounding of subsurface water on the upstream side helps the water, which may otherwise flow away, to percolate into deeper layers of the soil profile. ▸ As the impounded water becomes the subsurface, recharge to the source well gets quicker. ▸ Retention of water for a longer period of time. It helps for longer infiltration. ▸ It can sustain in high intensity rain or flood	▸ Machinery is required for excavation ▸ If the filling material is not properly done the structure may fail ▸ Site selection needs expertise

B. Unconventional measures

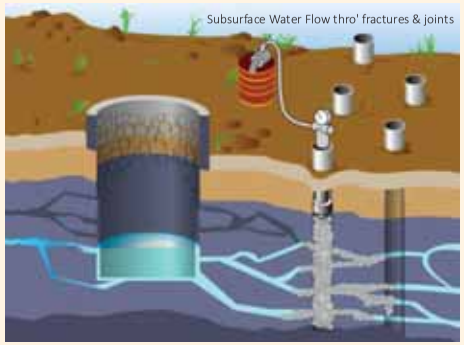
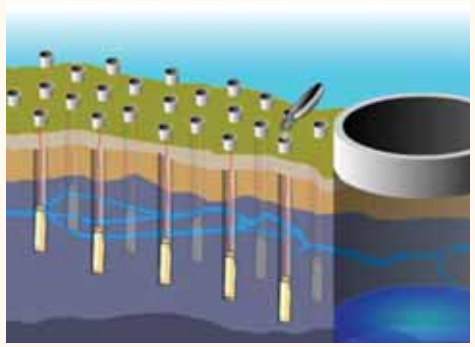
When the natural processes and conventional measures are not sufficient to meet recharging requirements or when there is an imbalance between the natural recharge and withdrawal of water, it is necessary to accelerate the recharging process artificially. Most of such techniques are useful in terrains with hard rocks as hard rocks have no primary porosity. Artificial methods will help in creating porosities.

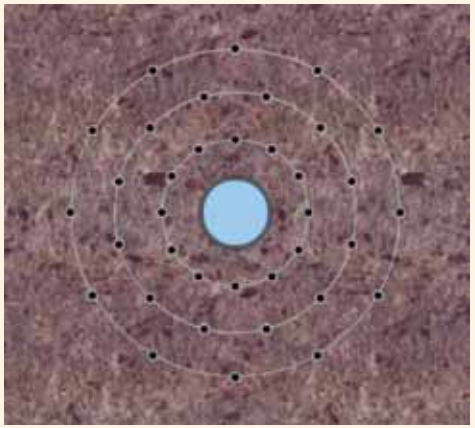
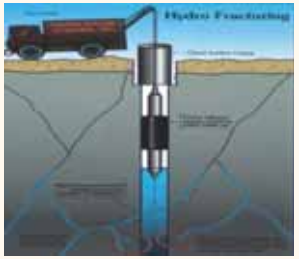
Since these methods are highly technical, there is a need for relevant and special equipment to carry out the required actions. The states of Maharashtra and Gujarat are using these methods for groundwater recharge.

Objectives of these methods are:

- To increase the groundwater level
- To construct secondary aquifer in rigid mountains
- To deviate the upper surface water of nearby channels towards drinking water sources

The following unconventional measures are commonly taken up in the field:

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Fracture seal cementation 	FSC is a technique to arrest the subsurface groundwater movement through a fractured network. Objective: ▸ To strengthen the existing drinking water sources located in the upstream direction within hard rocks ▸ To stop or control, the interference of adjoining private wells, if any	Under this process, normally one or two rows of boreholes are drilled to a depth of little more than the depth of the dug well in the surrounding area. Through these bores cement slurry is injected under desirable pressure so as to seal the existing fractures, resulting in the formation of a diaphragm across the discharge point. This technique creates an effect of 'Cut-off-wall' or 'underground bandhara' in hard formation.	▸ If properly done, the structure is almost permanent ▸ The subsurface flow is kept in check and benefits the source well ▸ Pumping duration of the well is enhanced	▸ Drilling equipment is required ▸ Geological expertise is required ▸ The drilling equipment should be able to access the site
Bore blast technique 	This is a method of drilling blast holes placed in a zigzag manner and adopting controlled blasting techniques so that the fractures and fissures in the hard rocks get widened and allow recharging of the nearby drinking water sources. Objective: ▸ To create and increase the fracture intensity thereby increasing the transmission of water	Bores are drilled in a staggered pattern and suitable types of explosives are lowered into two to three sections within these boreholes for effective blasting.	▸ Recharge can significantly increase the sustainable yield of an aquifer ▸ Groundwater recharge stores water during the wet season for use in the dry season, when the demand for water is the highest ▸ The quality of the aquifer water can be improved by recharging with high-quality injected water	▸ There is a possibility of contamination of the groundwater from the injected surface water run-off, especially from agricultural fields and road surfaces ▸ Unless significant volumes of water are injected into an aquifer, groundwater recharge may not be economically feasible ▸ Recharge can degrade the aquifer unless the quality the injected water is adequately controlled

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Jacket well 	This technique is similar to the BBT. The only difference is that a particular drinking water source like an open well is already identified and the surroundings are blasted accordingly to allow more recharge. Objective: To increase effective diameter of the well artificially, thereby increasing its storage capacity and improving water-transmission the aquifer.	Boreholes to a depth little less than that of an open dug well are drilled in a circular /semi-circular pattern around the targeted well. Subsequently blasting is carried out so as to create artificial fractures in the compact rocks, which ultimately get connected to the drinking water source well. Explosives of required strength and quantity are used to create maximum fractures and to interconnect them. Sand is generally filled into the boreholes for effective blasting and to keep the cracks open even after blasting.	▸ If properly done, the structure is almost permanent ▸ The recharge is enhanced and the source well can then sustain over r longer ▸ Pumping duration of the well can be enhanced ▸ The groundwater available around the well percolates into the well	▸ Drilling equipment required ▸ The drilling equipment should be able to access the site ▸ Geological expertise is required ▸ Risk in blasting
Hydro-fracturing 	Hydro-fracturing is a process whereby hydraulic pressure is applied to an isolated zone of bore well to create new fractures and widen the existing ones. Objective: To improve secondary porosity in the hard rock strata.	In this technique, very high hydraulic pressure is created between the confined sections of the bore well. This pressure is responsible for opening the blocked or sealed fractures, further connecting them to nearby water bodies.	▸ Most bore wells are reclaimed by this technique ▸ It is a very sophisticated procedure ▸ It recovers the loss to some extent	▸ High cost and imported machinery is required ▸ Skilled human resource is required

Method/Technique	About the technique	Technical specification	Advantages	Limitations
Recharge shafts 	Recharge shaft is an artificial recharge structure which penetrates the overlying impervious horizon and transports up surface water to recharge the phreatic aquifer. Objective: To augment recharge into phreatic aquifers where water levels are much deeper, the aquifer zones are overlain by a strata having low permeability.	These structures are ideally suited for areas with deep water levels. In areas where low permeable sandy horizon is within shallow depths, a trench can be excavated to a 3 m depth and backfilled with boulder and gravel. The trench can be provided with an injection well to effectively recharge the deeper aquifers.	▸ Does not require the acquisition of a large piece of land ▸ No losses of water in the form of soil moisture and evaporation ▸ No additional investment is required as not-in-use or even operational dug wells can be converted into recharge shafts ▸ The technology and design is simple ▸ The recharge is fast and immediately delivers the benefit	▸ In case of dug wells, if the pipe connecting the water source and recharge shaft is not kept above water table there are chances of the aquifer getting choked

4.2.4 Water source augmentation measures

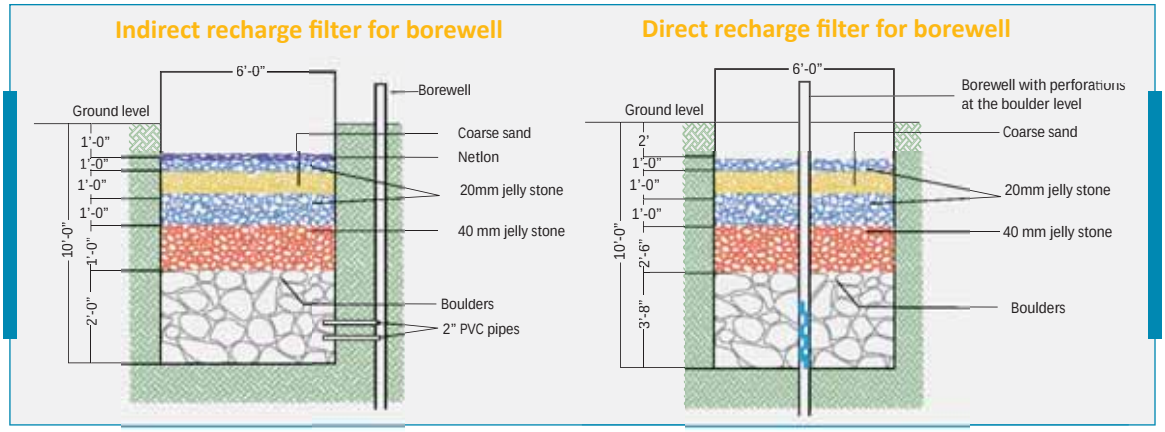
a. Bore well recharging

Bore wells can be recharged during the monsoon season with this very efficient and economically viable method. Usually high yielding bore wells or tube wells are selected for recharge in those areas which have good quantities of run-off rainwater or where water can be diverted easily. The physical condition of the source should be good. The surrounding areas should be clean and healthy. No polluting body should exist near the source. Direct injection recharges the deeper aquifer immediately. The run-off water is used to recharge larger quantities of groundwater

Design and execution:

Depending upon the area available, a pit is excavated near the bore well up to the hard rock or impervious rock. The pit is filled with small boulders, pebbles and sand. Rainfall run-off is diverted towards this pit in a controlled manner so that the pit is not flooded and does not overflow.

Direct recharge is recommended only if the bore well has gone dry or is yielding very small quantities of water. Indirect recharge is recommended for well-functioning borewells.[8]



b. Rooftop rainwater harvesting

b.1 Rainwater harvesting is a technology used for collecting and storing rainwater from rooftops, land surfaces or rock catchments, using simple techniques such as tanks and sumps, as well as more complex techniques such as underground check dams. Rainwater harvesting means capturing and storing rainwater and run-off water irrespective of the location. Rainwater is a free source of nearly pure water. It can be used to supply potable (drinkable) water as well as non-potable water. For non-potable uses like watering landscapes, it is ready for use as it falls from the sky. For potable use, the rainwater must be treated first in order to remove or kill disease-causing organisms that may be present in the water.

The collected water can either be stored in a tank or diverted to artificial recharge system. This method is less expensive and is very effective and if implemented properly, it can augment the groundwater level of the area.

b.2 For the purposes of rainwater harvesting, roofs are broadly classified into two types:

1) Flat roofs

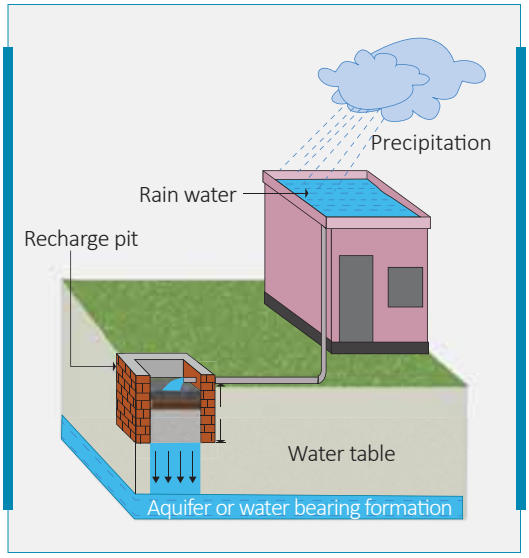
2) Sloping roofs

8 rainwaterclub.org

- **Flat roofs** are made with reinforced cement concrete that normally have water proofing on the surface. The water proofing is done with a small slope towards the down-take pipes. While the usual practice is to use lime mortar (cement mortar is also being of late). Usually these types of roofs are found in multi storeyed buildings and bungalows.
- **Sloping roofs** are typically either made of tin sheets or clay tiles or are simply made of mud. The earthen roofs are not very useful in rainwater collection, but if covered with plastic sheets they can be used for the purpose.

Roof catchment

A catchment for rainwater harvesting is any roof area contributing to rainfall collection. Any area which drains rainwater is a catchment. It can be terraces, roofs, water tank tops etc. The catchments should be clean and free from any polluting or contaminating substance. The catchment area should not be used for storage.



Volume calculation

Before calculating the volume, one should know that depending on the materials of the roofs, different roofs have different coefficients for run-off. The details are given in the table below:

S.No	Roof type	Run-off - coefficient
1	Earthen tiles	0.8–0.9
2	Metal sheets	0.7 –0.9
3	Concrete	0.6–0.8
4	Soil roofs with plastic sheet	0.6–0.8

Storage

Storing of rainwater is a costly affair. While designing storage, the per capita water requirement is calculated and accordingly storage facilities are designed.

Data requirement

The basic data required to plan for rooftop rainwater harvesting are:

1) Roof area
2) Roof type
3) Annual rainfall on-site
4) Water requirement
5) Water shortage
6) Storage availability
7) Size of the storage
8) Additional storage required

Technical suitability

Rainwater harvesting is simple; however, technical care is necessary during operation. Before attempting rooftop rainwater harvesting, it is necessary to make sure that the roofs are clean and have no dumped materials. The storage area should also be pollution free. The main factors that should be considered are:

1. Catchment area of the roof
2. Rainfall
3. Rainfall intensity
4. Environment
5. Storage system
6. Availability of space
7. Filter requirement

Do's and don'ts in rooftop rainwater harvesting:

Since a wrong practice can lead to contamination of an aquifer and lead to the spread of waterborne diseases, it is necessary to keep in mind the dos and don'ts of rooftop rainwater harvesting.

Dos	Don'ts
▶ The roof should be cleaned before the rains. ▶ Suitable filtration methods should be adopted to filter rainwater. ▶ The plumbing work should be done well and only materials with the ISI mark should be used. ▶ The down pipes and other materials which require fixing on walls need to be clamped properly at regular intervals. ▶ Sunlight-protected lids need to be installed on the storage tanks and the storage tanks must have proper manholes. ▶ The masonry tanks should be maintained and painted properly every year. ▶ Before collecting rainwater in the storage tanks, the tanks should be cleaned properly before every monsoon.	▶ Asbestos sheet roofs should not be considered for rainwater harvesting. ▶ Materials containing any metal, iron rods, sheets and cement sacks should not be stored on the catchment roofs. ▶ Sunlight should not reach stored water; hence all the leakages in the lids should be checked to prevent bacterial contamination. ▶ Water should not be taken out manually.

(Continued)

(Continued)

Dos	Don'ts
▶ Any leaking tap needs to be replaced. ▶ Filters of all kinds need to be cleaned and maintained in a proper manner. ▶ Regular monitoring of stored water for any chemical or bacterial contamination needs to be done. ▶ The water from the first rainfall needs to be flushed out completely as it is contaminated. ▶ Filter material like sand, gravels, pebbles, boulders should be in line with the quality of rainwater as well as with the silt and clay content. Hence, the size of such material should be selected accordingly. Moreover, it will need cleaning before every monsoon. ▶ All rooftop rainwater harvesting systems should be connected to a groundwater recharge system so that when water overflows it does not go waste. ▶ Before adopting direct injection method, it is advisable to take a pump test to know the intake capacity of the bore well.	▶ For storage or recharge, entry of rainwater directly from the roof should be prevented. ▶ Every drop of rainwater should go through the filtration system. ▶ The water from the first rainfall should not be collected or recharged directly or indirectly.

c. Groundwater recharging, basic treatment and reuse of greywater

Greywater treatment and reuse should be taken up as a promising step for conservation of water in view of the present water scarcity in India. The technology should be adopted based on greywater characteristics and the purpose for which treated water is to be used. The reuse of treated water can reduce our fresh water requirement for non-potable purposes such as toilet flushing, garden irrigation, floor and lawn washing. It can also be used for ground recharging.

The details regarding this topic are provided in Chapter 11.

Information regarding government-affiliated innovative technologies on water demand and supply management is available on following web links

1. https://indiawater.gov.in/misc/home.aspx
2. http://www.indiawater.gov.in/MISC/Homebp.aspx

4.3 Community mobilization and contribution/shramdaan for water conservation

There have been many examples of successful community mass movements for water conservation. The purpose of these initiatives is to involve every community member, man, woman and child so that every village has water security. For this purpose, people should come together on their own, without depending on any external support, and take up simple measures for rainwater harvesting and conservation. Shramdaan is the basic tool for water conservation. It is important to motivate and mobilize communities and drive home the importance of clean and adequate (and increased) amounts of water.

Various methods like competitions among villages, etc. to motivate communities. The better performing villages should be given priority in allocating development projects. The Sarpanch has a key role to play in leading the community and inspiring it to take collective action. He/she can coordinate the process once the community decides on a course of action.

Awareness camps can also be conducted to sensitize the community to the need for water conservation. Furthermore, house visits can be undertaken to mobilize households into constructing rooftop rainwater harvesting structures. Cultural events like Kala Jathas, Kirtans, film shows, etc. can be used to mobilize the community as a whole.

The above initiatives can also involve the government officers of various relevant departments. Community interactions and generating community-led planning for water conservation are some of the indicative village level activities.

Indicative list of schemes for undertaking water conservation works

- Mahatma Gandhi National Employment Guarantee Scheme
- Integrated Watershed Management Programme
- FFC funds

Both central and state government schemes can be integrated into the gram panchayat Development Plan for effective implementation at the village level.

4.4 Role of various departments in source sustainability

A. Agriculture Department

- Making available irrigation facilities to farmers through minor irrigation schemes so that they obtain maximum returns from their lands
- Educating farmers on soil and water conservation technologies through implementation of Watershed Projects

B. Groundwater Department

- Creating mass awareness campaigns on the importance of water conservation and judicious groundwater management
- Planning and management of local groundwater resources

- Development and augmentation of groundwater resources through various schemes
- Advising on rainwater harvesting
- Rendering technical guidance under minor irrigation programmes for locating suitable dug well sites and strengthening of groundwater sources through water conservation measures and artificial recharge projects for induced groundwater
- Providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of groundwater resources
- Conducting macro/microlevel groundwater management studies and exploratory drilling programmes. Monitor groundwater levels and water quality through a network of groundwater observation wells.
- Implementation of demonstrative schemes for artificial recharge and rainwater harvesting for recharge augmentation
- Conduct periodic assessments of groundwater resources

C. Forest Department

- Constructing and locating soil and moisture conservation structures in forest areas to recharge groundwater aquifer
- Advise GPs and farmers on how to conserve soil, to protect it from erosion and improve its fertility
- Support the watershed management carried out for integrated development of the area
- Management of catchment areas of water heads, degraded forest lands, and wastelands

4.5 Role of the sarpanch, swachhagrahi ASHA, AWW and gram panchayat in source sustainability

At the field level, PRIs and front-line workers can play an important role in promoting water source sustainability. Their roles include assisting in the following:

Assessing and preparing a plan	▸ Assess water availability from all existing sources within the gram panchayat jurisdiction ▸ Assess the gap between demand and supply by using drinking water budget as a tool ▸ Address deficit of drinking water by increasing water through various implementations and measures ▸ Finalization of conventional and unconventional measures ▸ Preparation ad submission of plans
IEC	▸ Awareness camps to sensitize communities ▸ House visits, corner meetings, mobilizing youth and women groups ▸ Film shows, local cultural and spiritual programmes ▸ Performance competitions among villages
Convergence	▸ Identify available schemes and programmes for soil and water conservation and integrate those into the conservation plan (GPDP) ▸ Elicit help from the concerned department for using appropriate technologies to increase the availability of water from all sources

Ensure and support	▸ All institutional structures (schools, anganwadis, health centre, GP building etc.) at the village level to have a system of rooftop rainwater harvesting ▸ Communities to participate in Shramdaan ▸ All families in getting sufficient water throughout the year at all times
Promote	▸ Use of water as a precious resource. Save, conserve and harvest every drop of water ▸ Reserving adequate water for drinking purposes and then allowing use of water for other purposes (commercial, industrial and irrigation) ▸ Adopting water saving habits and regulating water supply by educating the community and promoting self-regulation ▸ Advantages of the works in terms of increased water availability for drinking and also for livelihoods ▸ The advantage and priority that better performing villages have over others in development projects of the Government ▸ Encourage individual households having feasible structures for rooftop rainwater harvesting

References for further readings

- https://mdws.gov.in/sites/default/files/Book-Sustainability%20Drinking%20Water.pdf
- https://nrega.nic.in/Netnrega/Data/SPS_Watershed_Works_Manual_Eng.pdf
- Training manual on village water safety and security developed by UNICEF, Maharashtra.
- Training Module: Managing Safe and Secured Water Supply by the Ministry of Drinking Water and Sanitation
- Mobilizing technology for sustainability by MDWS
- Guide on sustainability of drinking water sources for implementers and users

CHAPTER 5

OPERATION AND MAINTENANCE OF WATER SUPPLY SCHEME

Key learning points

- Introduction
- Operation and maintenance of water supply schemes
- Components of Operation and Maintenance: technical, financial and institutional
- Role of Sarpanches, VWSCs, Water person in operation and maintenance of water supply schemes

5.1 Introduction

Operation and maintenance of water supply schemes is important for having a functional, efficient and sustainable water service delivery. GPs are responsible for operation and maintenance of village water supply schemes. Inadequate management of operation and maintenance leads to irregular water supply. Therefore, it is necessary for the GP functionaries to understand the technical, financial and institutional aspects of O&M to be able to manage day-to-day O&M of water supply schemes.

In this chapter, the concept and components of O&M of water supply facilities and the processes for effective water quality management and surveillance have been described.

5.2 Operation and maintenance of water supply scheme

As mentioned above, the GP is responsible for providing safe and regular drinking water to the community. Apart from developing water supply systems, appropriate O&M is essential for effectively delivering safe water services as long as the scheme lasts. If there is proper O&M of the water supply systems along with the involvement of community, it would lead to cost effectiveness, longevity and effective functioning of the system. Most importantly, it will lead to satisfaction among consumers and to better collection of water tax, making the systems financially sustainable.

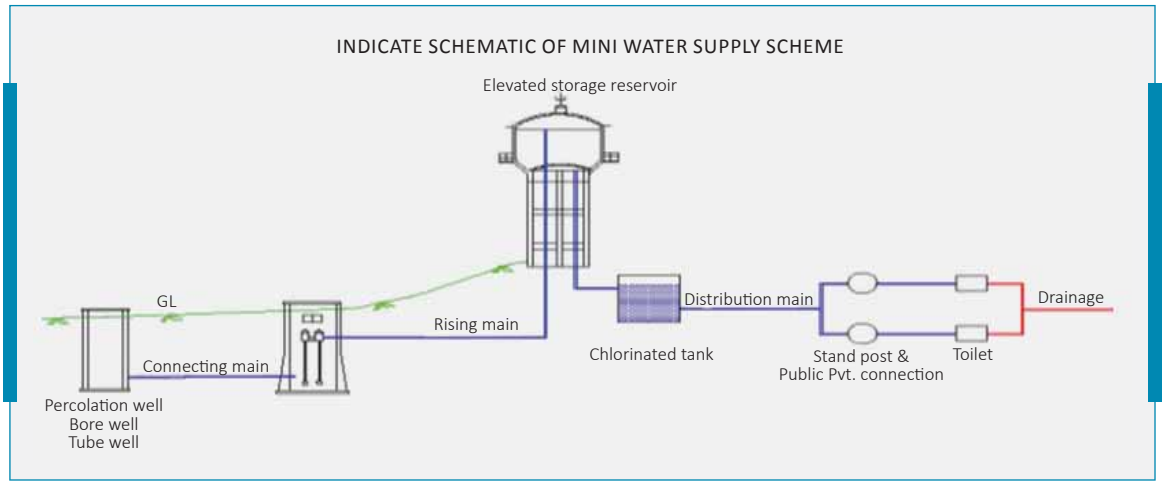
As per the O&M Manual (MoDWS GoI, 2013),

Operation:

"Operation refers to the effective, timely and daily operation of the components of a water supply system such as head works, treatment plant, machinery and equipment, conveying mains, service reservoirs, distribution system etc., by various technical personnel, as a routine function."

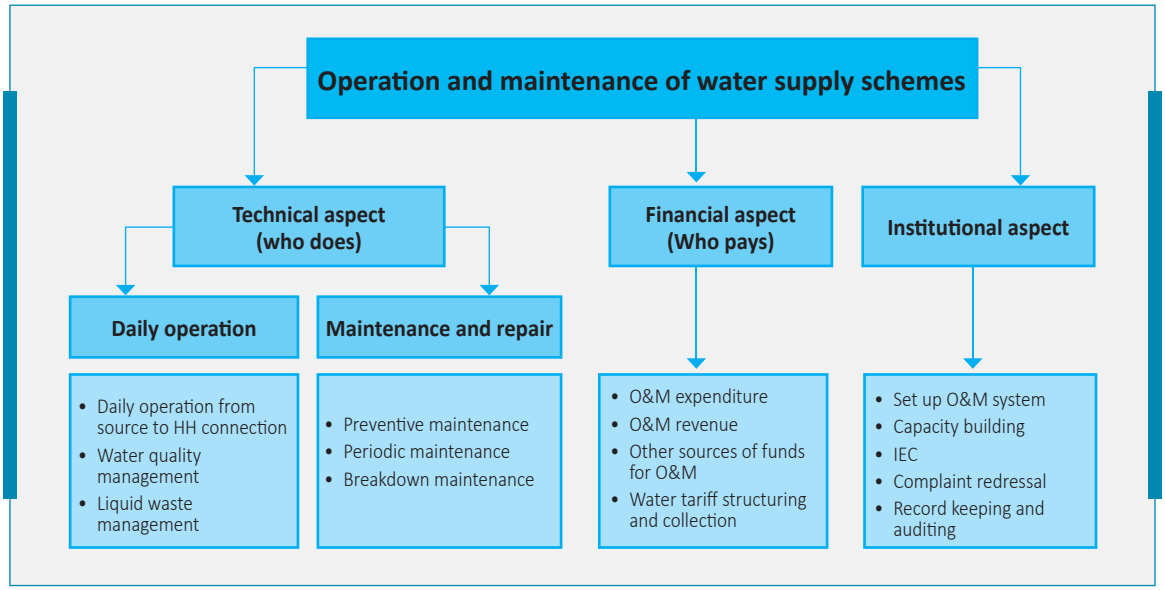
Maintenance:

"Maintenance is defined as the act of keeping the structures, plant, machinery and equipment and other facilities in an optimum working order."



5.2.1 Components of operation and maintenance of water supply scheme

The schematic below presents three major components of O&M and the details of each are provided subsequently.



A. Technical aspect of O&M

Technical management is the main component of O&M of any water supply scheme. An uninterrupted and efficient running of the system can be ensured only through proper technical management. The technical aspect of O&M consists of daily operations, regular maintenance and repair, water quality management and liquid waste management.

A1. Daily operations:

This includes operation of pumps, storage tanks, the distribution system including pipelines and valves, tap stands (posts), water quality management, documentation, liquid waste management, etc. Simultaneously, it deals with monitoring of the system and necessary repairs. The key tasks in daily operations are-

A1.1. Daily operation from source to HH connection

- Deciding daily pumping hours considering the present population, number of connections (individual, institutional and stand posts) and the rate of water supply (as per norm).
- Deciding supply timings (morning/evening).
- Pumping and storing adequate quantities of water in the storage reservoirs (GSR/ESR) in morning and evening supply hours. In case of automated operations through sensors, physical monitoring of adequate quantities should also be done.
- In case of electric pumps, the pumping hours should be decided based on the electricity supply in the village.
- In the case of solar pumping, the availability of sunlight hours needs to be considered to meet(by pumping and storing) the daily water requirement.
- Distribution of water in the village at specified times by operating various valves, if any.
- Physical verification of household connections and public stand posts for water supply as planned, and ensure that the water has adequate pressure and runs for a significant period of time.
- Ensure that there is no misuse, unaccounted withdrawal/use of water in the village and take appropriate actions if such cases are noticed.

A1.2. Water quality management

- Monitor water quality at the source and in the system on a regular basis
- Ensure availability and roper storage of TCL
- Regular disinfection of water using TCL powder or on-line chlorination systems
- Regular O.T. testing

A1.3. Liquid waste management

Wastewater management is an important part of the technical management. If not managed properly, it poses risks to the water quality and will indicate suboptimal maintenance of the scheme.

Routine scenarios in villages:

- Lesser number of taps on stand posts/ household connections, water flowing continuously and needlessly through household connections and public stand posts, choked surface drains, stagnated water on roads.
- Slushy areas near the public stand posts, making it difficult to even approach the stand post.
- Water accumulation in low-lying areas of villages, resulting in the breeding of mosquitoes and foul smell.

Why liquid waste management?

If wastewater is not managed properly then it results in:

- Mosquito breeding, in stagnant water, which may cause diseases like malaria, elephantiasis and encephalitis.
- Wastewater finding its way into distribution networks resulting in contamination of water.
- Accumulated water in roads and low-lying areas causing inconvenience to villagers.

Key actions for liquid waste management (greywater/sullage)

- Ensure proper drainage systems near public stand posts and household connections, either by constructing kitchen gardens and/or soak pits.
- Ensure that there is a proper drainage and disposal system at the household level before sanctioning a household connection.
- Ensure that there are taps on the stand posts and household connections and that these taps remain closed when not in use.
- Ensure that the wastewater is flowing into the main gutters / surface drains and the surface drains are cleaned regularly.
- Carry out maintenance and repairs of existing surface drains and construction of new surface drains through various public schemes, wherever required.
- Develop dedicated treatment facilities if huge quantities of wastewater are being produced in a village.
- Measures like guidance from experts in the field, arranging trainings, demonstrations, workshops for building public awareness and their participation to be undertaken.
- Public education for creating awareness on the consequences of water misuse.
- Look over wastewater management works in a village. This can be done by the ward representative of the VWSC.

A2. Regular maintenance and repairs

The purpose of regular maintenance is to see that all civil works (well/stand posts, switch room etc.), machinery and equipment (pumps, valves, switches etc.) are in optimal running condition and to carry out timely repairs if some of these works fail during operations.

A2.1. Preventive maintenance is very important for proper and continuous service delivery. These are the actions carried out so that all subworks, machinery and equipment of the scheme remain in working condition and their breakdown is minimized. This also includes observing and recording the changes observed during operation, e.g. reduction in discharge of pumps, valves not operating, leaking valves, etc.

A2.2. Periodic maintenance works are taken up as per specifications and protocols, on a regular basis. (E.g. changing spare parts like contacts, painting, cleaning tanks, oiling and greasing, washing pipe lines, etc.). This will ensure that the scheme runs under optimal conditions.

A2.3. Breakdown maintenance- In cases, like, breakdown of pumps, leakage in distribution lines, etc. that hampers regular water supply, immediate action like replacement or repairing needs to be undertaken by the GP, so that supply of water can be resumed at the earliest.

O&M tool kit

Most of the time, water supply is interrupted due to the unavailability of spares and tool kits. If the water-person is provided with an O&M tool kit, maintenance and repairs of water supply facilities can be carried out seamlessly at the time of need and requirement. Following is an indicative list of tools and spares which the GP can provide the water-person with.

A. List of spares

Pipes – 2 of each class/diameter	Solvent cement of standard company – 1 Kg
Couplers – 2 of each class/ diameter	Brass Ferules of 12 mm diameter each – 10
Bends – 1 of each type and diameter	Spindles of sluice valves – 1 of each diameter
Tee – 1 of each type and diameter	Solar lamps, fuses, solder wire, cables, dowels, solar panel mounting nut-bolts
PVC Saddles – 10	Anti-theft Nut-Bolts etc.
Rubber Packing – 10 Kg	

B. List of tools

Pliers, spanner set, Pipe wrench, screw driver, hammer, hack saw, blades, file, hand drill, pickaxe, shovel, *ghamele*, bucket, chisel, rope, *sibble* (digging bar), drill bits, wooden mallet, sand paper, gland packing, adhesive, thread for pipe couplers, wire cutter, measuring tape, crimping tool set, angle finder, compass, wire cutter, nut driver, flashlight, cutting pliers, wire stripper, soft cleaning brush or sponge, battery wire filler, dynamic control (DC) millimetre, electrical tester, spanner set and soldering gun.

Safety tools- rubber gloves, rubber shoes, first aid box etc.

B. Financial aspect of water supply scheme

After completion and handing over of the scheme, the GP is responsible for the management of the funds for O&M of the scheme. Efficient and effective management of funds for O&M as per the requirement is called financial management of the water supply scheme.

There are two types of expenditures that need to be considered: (i) fixed costs and (ii) variable costs. Fixed cost means the fixed expenditures, like the monthly payment of the water person and variable cost are costs that vary as per operational requirements like increase in TCL requirement during village festivals. For financial management, the GP has to prepare an annual financial budget. This will enable the GP to understand the amount required for O&M of the scheme and the various sources from where the required funds could be mobilized.

B1. Preparation of budget

Calculation of the expenditure required for O&M of the scheme and the total revenue which needs to be generated as part of the budget. Following points need to be considered during the preparation of the budget:

i. O&M expenditure

For calculating the expenditure for O&M of the scheme, GP/VWSC has to consider three important areas of expenditure:

1. Expenditure required for regular operation
2. Expenditure required for maintenance
3. Expenditure required for repairing

The GP/VWSC has to decide on the total expenditure required on these three major areas related to the scheme throughout the year, based on similar experiences and/or technical advice.

ii. O&M revenue

The GP needs to finalize the income sources to obtain the funds required for O&M of related activities. To generate this fund, the GP/VWSC can take the following steps:

1. Collect water tariff
2. Charge households fines for not paying tariff regularly
3. Connection charges for new private connections
4. Extra charges for commercial connections, etc.

Sample format for calculating the water tariff budget has been attached as Annexure 2.

Other sources of funds

GP should strive to collect entire funds for O&M of their water supply scheme through community participation. However, there may be cases where this is not possible e.g. where many families are unable to pay full water charge/tax due to economic reasons. Apart from this, the GP has to allocate funds for source sustainability interventions, water quality testing and management and organization of trainings etc. Therefore, additional sources of funds may need to be tapped into to support O&M of the schemes. Following is an indicative list of the different schemes and programmes with the help of which funds can be mobilized.

S.No.	Purpose	Sources of funds
1.	Source sustainability structures	NRDWP, MGNREGA, National Rural Livelihoods Mission, own source revenue, voluntary contributions, untied funds, user charges
2.	O&M	NRDWP, state and central Finance Commission grants, own source revenue, voluntary contributions, untied funds, user charges
3.	Tackling water quality issues	NRDWP, own source revenue, voluntary contributions, untied funds, user charges
4.	Training and IEC activities	NRDWP, own source revenue, voluntary contributions, untied funds, user charges

B2. Water tariff structuring and collection

i. Water tariff structuring

- Households collecting water through stand posts: Basically, the households with low incomes fall in this category. It is only fair that low tariffs are collected from these families.
- Consumers who have individual household connections: Tariff for this category is fixed by distributing the balance of O&M expenditure which is obtained after deducting the water charges collected from the remaining two categories: households collecting from stand posts and commercial connections. Due consideration should be given to low income families, such as Below Poverty Line (BPL) households thereby providing for cross subsidization on grounds of equity.
- Commercial and institutional connections: This category comprises users such as hotels and restaurants, shops, factories, private dispensaries, etc. As this category of users operates on a commercial basis, the users may be charged higher tariffs compared to the other groups.
    - However, the above suggestions are only recommendatory. The GP may decide on the tariff and amend provisions of tariff as per its own requirement and availability of funds.

ii. Billing and collection:

The GP/ VWSC may collect water charges from consumers and utilize the revenue generated for the maintenance of the scheme in an orderly manner and this should be clear to all residents. The distribution of bills can be carried out by the operators/ bill collectors specially authorized for this purpose. The charges can be collected

a) at counters in the GP/VWSC office or

b) through door-to-door collection by an authorized person, etc.

C. Institutional aspect of water supply facilities

A strong institutional system is important for effective O&M of any water supply scheme. The following institutional aspects need to be considered while setting up such a system –

C1. Hiring O&M service through contractor/SHGs

In case of a newly constructed drinking water supply scheme, very often the concerned contractor is also responsible for O&M of the scheme for three to five years. With regards to obtaining O&M services, the GP would be required to enter into a contract with the contractor. A local/barefoot technician, appropriately trained, should be appointed by the contractor for

regular O&M of the scheme. The contractor should provide the technician with an O&M kit for regular operations and minor repairs. After the completion of the contract period, the GP shall be responsible for O&M of the water supply scheme. When the GP is unable to manage the scheme, the scheme may become non- functional or may even malfunction. In such cases, the GP may appoint a self-help group (SHG) or any other service contractor for repair services.

For efficient implementation and management of the scheme, the capacity of the VWSC/GP and village water person requires to be strengthened.

C2. Distribution of work and responsibilities

The following activities are required for distribution of work and responsibilities:

i. Appointment of a water person

A dedicated water person at the GP level may be appointed on a part-time or contractual basis, to take care of day-to-day operations of the scheme. S/he would need to be trained by the implementing agency responsible for the O&M in undertaking minor repairs. The person should be paid a fixed service charge for day-to-day operations, regulation and management of water supply (to be decided by the GP). An additional service fee for undertaking additional O&M works at individual activity rates indicated by the RWS/PHED for such works. The additional fee may also be decided upon and fixed by the GP.

Roles and responsibilities of the water person

- Operate the pump at fixed hours for the specified duration in order to pump water into the GSR/ESR.
- Distribute water in the village by operating various valves at specified times.
- Monitor, on a regular basis, the quality of water being supplied.
- Ensure proper disinfection of the water as per instructions.
- Verify whether the water being distributed through house connections and public stand posts, has adequate pressure and runs for a significant period of time.
- Ensure that there is no misuse, unaccounted for use of water (theft) in the village and resolution of the same, if such a case is noticed.

Also, the VWSC/GP members from the respective wards, should meet the inhabitants of their wards periodically to ensure that there are no hindrances to the water supply, and take corrective actions if required.

ii. Roles of gram panchayat in O&M of water supply scheme

- Undertake O&M of the scheme after it is taken over by the GP.
- Prepare an annual O&M budget, fix water tariff and establish mechanisms for timely water tariff collection.
- Ensure formation and strengthening of VWSC for efficient supervision of water schemes.
- Safeguard transparency in operations of the scheme.
- In case of system failure and cessation of water supply, take immediate actions to restore the system's original functions. In case of delay, organize alternative arrangements so that the community is not deprived of water services.

- Make available the GP contribution for O&M and collect water tariff from users.
- Engage a village water person. Coordinate to build her/his capacity and monitor his/her job performance.
- Monitor activities of preventive maintenance and timely repairs of all water sources.
- Ensure carrying out regular water quality testing of all sources used for drinking water – both chemical and bacteriological.
- Identify reasons and sources of water contamination and enable necessary mitigation measures.
- Develop a system for water disinfection, regular testing of water samples from source to distribution and water quality control.
- Immediately communicate any water quality issues to the Block Development Officer (BDO)/ Jr. Engineer and Health Department representatives and also seek guidance from these various government officials on the same from time to time.
- In the case of breakdown of drinking water schemes, ensure quick repairs. In the case of long-term breakdowns, arrange for alternative water supply sources.
- Generate awareness among the community on the need to properly treat drinking water during epidemics.
- Sensitize the community members to the necessity of proper water handling and storage practices at the household level.

C3. Complaint redressal

The customers always have certain expectations such as, adequate water pressure, regular and timely f water supply and good water quality. However, due to improper operation and untimely maintenance, the water supply may get disturbed and such conditions may result in complaints which require immediate redressal. Whenever any such complaint is received, the water person should note it down immediately in the complaint register., Then the cause of the complaint should be found and necessary steps should be taken to redress the cause. If the nature of the complaint is such that it cannot be handled by the water person at his/her level (e.g. irregular power supply resulting in less pumping) or if materials required for the repairs are not available, s/he should inform the GP/VWSC Secretary immediately of the problem. In such a situation the Secretary should take necessary steps. Once the problem has been addressed is managed, it should be noted down in the complaint register and must bear the signature of the Secretary. The Secretary of GP/VWSC may also review various entries in the complaint register at least once a week.

C4. Record keeping

The person responsible for water supply in the village is expected to maintain date-wise record of all major and minor repairs, replacement of parts, pumping log book, history book, TCL stock register, O.T. test, etc. and should present these records to the gram panchayat/VWSC periodically. The GP should follow audit procedures to maintain transparency.

D. Role of sarpanch, swachhagrahi, VWSC ASHA, AWW and gram panchayat for effective operation and maintenance of water supply scheme.

Facilitation	▸ Form and strengthen VWSC ▸ Appoint a village water person. Coordinate to build her/his capacity ▸ Preventive maintenance and timely repair of all schemes ▸ Procure essential components and spares for the toolkit at the village level. Ensure that the water person is fully equipped for operation and minor repairs ▸ Involve all sections of the community. For sustainable management of water supply systems, community participation is non-negotiable ▸ If required, enter into a service contract with a contractor/SHG for O&M
Management	▸ Support the gram panchayat in managing water supply schemes ▸ Manage income and expenditure for O&M of the water facility ▸ Maintain the complaint register and resolve all disputes regarding water supply
Ensure	▸ Daily operations of the water supply facility ▸ That discriminatory and illegal practices do not take place ▸ That all records are well maintained by the water person and village secretary ▸ The preparation of the annual O&M budget and fixing of water tariff ▸ Regular collection of water tariff
IEC	▸ Lead IEC to generate community awareness on- ▸ The benefits of household connections ▸ The necessity of valuing water and paying for water for the sustainability of the water supply scheme ▸ Mechanisms for timely water tariff collection ▸ The need for judicious use of water and the need to curb water wastage and misuse The need to adopt correct water storage and handling practices ▸ The need to protect water supply schemes from damages and theft ▸ The importance of community- involvement for the long-term benefits water supply schemes

CHAPTER 6

WATER QUALITY MONITORING AND SURVEILLANCE

Key learning points

- Background
- Water Quality Monitoring and Surveillance (WQM&S)
- Process for conducting sanitary survey of drinking water sources
- Water quality testing: tests using the Forensic Toolkit (FTK), priority parameters of chemical contamination and water tests in labs, feedback mechanism and awareness generation
- Preventive and curative actions: protect drinking water sources and systems from contamination; chlorination; Ortho Toluidine Test (OT test)
- Types of records and ways of maintaining records
- Role of the GP/sarpanch, swachhagrahi VWSC in WQM&S

6.1 Background

Safe drinking water must be free from bacteriological and chemical contaminations. The bacteriological contamination in drinking water may cause diarrhoea, dysentery, typhoid fever, cholera, jaundice, etc. Excess fluoride in drinking water can cause dental, skeletal and non-skeletal fluorosis. Arsenic contamination of drinking water causes dermatosis. Excess nitrate in drinking water may result in blue baby syndrome among newborn babies.

The Government of India as well as the state governments are committed to supplying safe and adequate water to every rural community. To achieve this, the Government has initiated the WQS&M programme. A community-based management system is essential to achieve the objective of this programme. Thus, it is the responsibility of the GPs and VWSCs to implement this programme so as to provide safe and disinfected water to all the villagers. It is important to develop the capacities of and provide adequate support to the water person, VWSC committee, panchayat members, community leaders, primary teachers, health workers etc. for effective implementation of this programme.

The importance of the WQM&S programme and activities that need to be organized at the village level under this programme for safe water supply is described in this section.

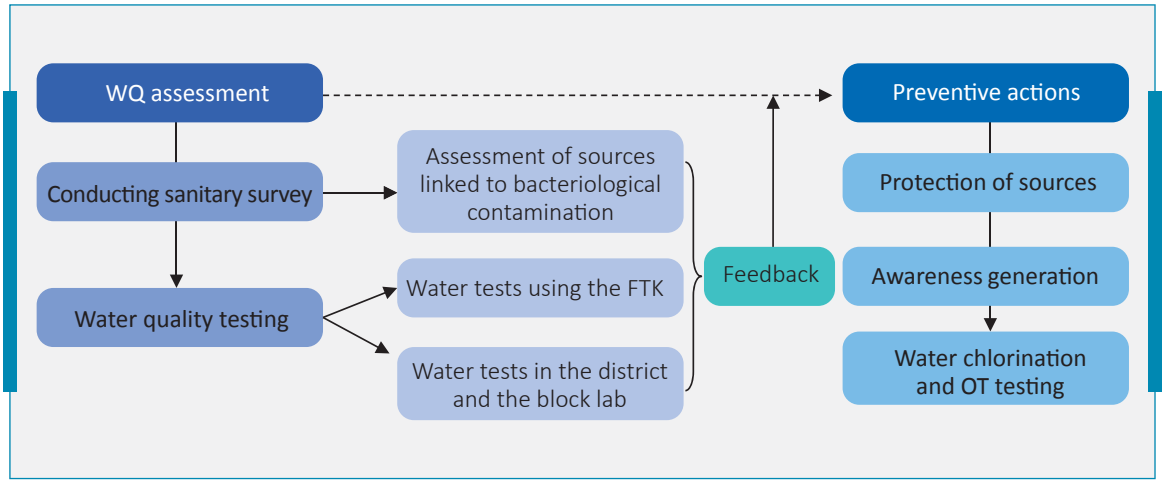
6.2 Water quality monitoring and surveillance

In order to render water fit for drinking, most of the available water needs to be treated prior to drinking. Although appearance, taste and odour are helpful indicators of the quality of drinking water, they are not sufficient. Suitability in terms of public health is determined by bacteriological, physical, chemical and radiological characteristics. Of these, the most important one is the bacteriological quality. Moreover, a number of chemical contaminants are also often found in water. It is important to ensure that water does not get contaminated during its journey from the source to the user points. If water is contaminated at the source, it is necessary to protect the source. Water can also get contaminated during supply and when being handled at the household level. Hence, it is the responsibility of VWSC to ensure that water does not get contaminated during the process of water supply and at the household level during handling and storage.

Thus two key steps are important for safe water supply:

1. Water quality assessment
2. Preventive actions

The activities related to water quality assessment and preventive actions for safe water supply are given in the chart below:



6.2.1 Water quality assessment

A. Sanitary survey

Sanitary survey is an on-sight inspection and assessment of all conditions, applications and practices in the water supply system that are potentially hazardous to consumers.

During a sanitary survey, the water supply facility should be examined for contamination first at the source, and then at every stage, from source to storage to the end user points. Such assessment enables the community to identify the problems and determine measures to prevent existing and potential contamination of water. The sanitary survey is also conducted to identify

possible reasons for water contamination and take necessary steps/ implement measures to address those. The gram panchayat and VWSC should carry out the village sanitary survey on a regular basis. During this survey, all members of the VWSC, including the ward representative and the person(s) responsible for water supply, men, women and youth of the village should be present. This survey is expected to pin point the possible reasons for contamination of the source. Once the reasons for contamination are known, solutions can be devised and adopted accordingly.

The following points, among others, need to be considered and observed during sanitary survey:

- Cleanliness around the source and in the catchment
- Accumulated water around the source
- Likely causes of pollution of percolation tanks/ village tanks etc. on the upstream side
- Presence of nearby toilets
- Pipelines passing through gutters
- Defective connections
- Identifying locations of inadequate water pressure and its reasons
- Conditions of surroundings of stand post(s)
- Status of soak pits near the stand posts
- Water storage and handling habits of villagers including handling habits at home
- Status of sanitation and water supply and quality in schools, anganwadis and other public places
- Any other relevant issues

A.1. Data processing and evaluation

This involves processing of large amounts of data generated in the course of monitoring and sanitary survey, to elicit precise information. This information can be utilized for decision-making and for improving the O&M components of the surveillance programme. Reports based on evaluated data should be presented to the GP/VWSC for further inputs that can be incorporated into the planning.

B. Water quality testing

Mandatory and routine tests using FTKs are undertaken to:

- Ensure quality of water supplied in any village, water quality testing is required to be undertaken at regular intervals
- Check the quality of water at the village level, the FTK can act as a local level laboratory. Hence, every GP should consider having a field testing kit and a village level technician trained in its usage. Sarpanches should see that their GPs have FTKs and trained technicians

If the parameters for the tests mentioned in the box are not within the range specified as permissible limits, the Sarpanch needs to contact the concerned block/ district level PHED/RWS Dept. Engineer in charge should ask for corrective measures to be undertaken.

Some important points....

- Chemical tests may be carried out at least once a year and bacteriological tests twice a year, typically before and after monsoons.
- The trained technician has to perform chemical tests for pH, alkalinity, hardness, chloride, TDS, fluoride, iron, ammonia, nitrite, nitrate, phosphate, turbidity, residual chlorine, by using the FTK.
- The H2S Strip test is a simple kit for a first testing of bacteriological contamination and can be use at the village level. The test price ranges from Rs 10/- to Rs 20/- per piece

Surveillance of drinking water quality is a critical, uninterrupted and vigilant public health assessment and a watchdog of drinking water supplies.

Water test in block/district lab

The Government has set certain standards required to determine the level of chemical and bacteriological contamination in water. Such tests are available at the block/district laboratory. Water samples should be sent to the block/ district health laboratory/ PHED/ RWS lab for bacteriological test. H2S vial testing is indicative. It is necessary to train the person responsible for collecting the water sample in bacteriological testing. It is also important that the GP has empty spare bottles to collect the water samples. The actions should be taken based on the advice of the Health Department. Bacteriological tests of water sources should be done at least twice a year (Once before the monsoon and once after the monsoon).

Chemical tests of water sources should be done once a year based on the parameters prescribed by the NRDWP (drinking water supply) guideline. The responsibility of water quality testing lies with the VWSC and GP. The results of both bacteriological and chemical contamination should be shared with all community members through public display of results and corner meetings.

6.2.2 Preventive action for safe water supply

Remedial action entails a series of actions to be carried out to rectify sanitary deficiency upon detection.

- Chemical contamination of water is prevented through application of techniques like RO and through community purification plants
- Bacteriological contamination can be prevented by following four interventions:
  A. Protection of the water source and the water supply system
  B. Disinfection of water
  C. Maintenance of water quality during supply
  D. Safe handling and storage of water at the household level

The details of these interventions are as follow:

Standards and specifications for some important water quality parameters

Parameter	Requirement desirable Limit	IS: 10500 permissible limit in the absence of alternate source
Colour	5 Hz	25 Hz
Turbidity	5 (NTU)	10 (NTU)
Odour	Unobjectionable	
Taste	Agreeable	–
pH	6.5 to 8.5	No relaxation
Total Hardness	300 mg/L	600 mg/L
Alkalinity Max	200 mg/L	600 mg/L
Chloride	250 mg/L	1000 mg/L
Fluoride, Max	1.0 mg/L	1.5 mg/L
Nitrates	45 mg/L	100 mg/L
residual chlorine	0.2 mg/L	1.0
Coliform Bacteria	Shall not be detectable in any 100 ml sample	

A. Protection of water source and water supply system:

Existing drinking water sources and fresh water sources need to be protected. This can be done by making villages open defecation free, maintaining a clean environment, safely disposing of solid and liquid waste, ensuring the control and treatment of industrial effluents, and raising awareness about the impact of using high concentration of fertilizers and pesticides on water. Indicative factors of contamination and mitigation measures are mentioned in the table below:

Risk factors	Protection measures
Source (open well, dug well, hand pump, bore well)	
▸ Washing utensils, bathing or washing of livestock near the water source ▸ Wastewater infiltrating into the source ▸ Public toilets and cattle shed in the proximity of the source ▸ Swimming in the source well ▸ Pollution in the percolation tank/village tanks on the upstream side of source ▸ Unhygienic condition near the source ▸ Use of dirty ropes/ buckets for fetching water from the source well	▸ It is important that the construction of the source is done properly and that its surroundings and catchment are kept clean ▸ Every measure should be taken to ensure that wastewater does not percolate into the source ▸ Washing of clothes and utensils and bathing around the source should be banned/ prevented ▸ Construction of toilets: private or public, cattle farms and soak pits should not be allowed within a radius of 15 m (50 ft.) of the water source ▸ Care should be taken to see that percolation tanks and/ or village tanks located in the vicinity of the source, or on the upstream side of the well, do not get polluted

Risk factors	Protection measures
	▸ Growth of bushes, formation of algae, should be avoided and if present, should be removed immediately from the water source's vicinity ▸ Source maintenance should be carried out before and after the monsoon ▸ Proper fencing around the source should be ensured
Storage tank	
▸ Lack of periodic cleaning of the GSR/ESR ▸ If the lid remains open, then dry leaves, birds etc. may enter the tank causing pollution ▸ Use of dirty rope or bucket ▸ Intentional pollution by human beings	▸ Ensure that water tank is always covered ▸ Water tank to have proper fencing ▸ Children or villagers should be allowed near the water tank ▸ Water tank should be thoroughly cleaned at least once in six months and as and when the need arises ▸ Water tank leakages should be repaired immediately
Distribution network	
▸ Leakages in distribution lines and valves ▸ Private connections in drainage lines	▸ Carry out repairs of leakages in the pipelines/valves immediately ▸ Ensure that the distribution pipelines do not pass through gutters, nalla, slushy areas, etc. ▸ The entire distribution network should be washed every six months. After washing, the network should be disinfected by using highly chlorinated water

B. Disinfection of water

Though water from the source may appear to be clean, there is every possibility that it may contain microorganisms/pathogens, making it non-potable. This may lead to various waterborne diseases like cholera, dysentery, typhoid, gastroenteritis, jaundice, etc. Hence, it is of the utmost importance that water disinfection is done properly and on a regular basis.

What is water disinfection?

The process of killing (inactivating) harmful and harmful bacteria, cysts and other microorganisms (pathogenic) by the use of various agents, such as chemicals, heat, ultraviolet light, ultrasonic waves, or radiation is called disinfection of water.

The following disinfection methods can be applied at the village level for purification of water:

Methods for disinfection of water - Chlorination

The simplest and easiest way of disinfection is chlorination, mainly because chlorine removes almost all pathogens, and it is very easy to test residual chlorine in the water. Use of bleaching powder (TCL powder) is the most convenient way of disinfecting water for small/individual rural water supply schemes.

Chlorination process

Following are the steps to be followed in chlorination process

If the chlorine content of the bleaching powder is less than 33 per cent, the quantity of bleaching powder for disinfection of the same quantity of water will have to be increased in the ratio of the theoretical content of chlorine and the actual content of chlorine.

Step 1: Take the measured quantity (5 gm. for 1000 litre) of bleaching powder in a plastic bucket and add a small quantity of water to it. Make a thick paste with the help of wooden stick

Step 2: Add more water to the bucket till the bucket is half- filled. Then with the help of wooden stick stir properly. Keep the bucket untouched for some time so that un-dissolved particles settle down.

Step 3: With the use of clean cotton cloth filter the chlorine solution into another bucket. Ensure that the un-dissolved particles are separated.

Step 4: With the help of a clean rope release the bucket in the water tank. While doing this, ensure that the outside surface of the bucket is clean.

About bleaching powder

- Bleaching powder is also known as T.C.L. powder.
- Fresh bleaching powder has 33 per cent chlorine in it; however, with the passage of time chlorine gas is emitted into the air and the percentage of chlorine in the bleaching powder reduces.
- It is important to store bleaching powder in a cool and dry space in a container with a tight lid to prevent reduction of chlorine in the bleaching powder.
- 5 gms of bleaching powder is required for proper disinfection of 1000 liters of water.
- At least half an hour is required for the chlorine to act on the pathogens and destroy them. Hence, it is necessary to carry out this process at least one hour before the supply hours.
- The quantity of bleaching powder required for disinfection depends on the quantity of water to be disinfected.

C. Maintain water quality during supply

Small amounts of chlorine remain in the disinfected water after chlorination. The presence of chlorine is a sign of successful water disinfection and indicates that the disinfection process is completed. The quantity of chlorine present in the chlorinated water protects the water from further contamination. It is important to measure the residual chlorine in the water after chlorination. The test to assess this residual chlorine is known as Ortho Toluidine Test or O.T. Test. This test has to be done every day at the water tank as well as at the tail end of the water supply scheme. It is easy to do this test using a small device called chloroscope.

Procedure of O. T. test

- Chloroscope is used for performing this test.
- Take the sample of chlorinated water which is to be tested in a test tube.
- Approximately three fourth of the test tube should be filled with water.
- Inject one to two drops of O.T. solution into the water in the test tube and stir the mixture.
- If the water contains residual chlorine, then the colour of the water will change to a yellowish colour (pale shade of yellow).
- Compare the colour of the water in the test tube with that of colour strips in the chloroscope. The sample contains the quantity of chlorine as indicated on the strip.
- The residual chlorine reading at the tank should be 1 ppm and the reading at the tail end should be 0.2 to 0.5 ppm.
- Zero reading indicates probable or heavy contamination of the water due to leakage in the pipeline or source contamination.
- If the colour of the sample does not change it means the water does not contain residual chlorine and the O.T. Test is negative. If negative O.T. test is observed repeatedly, then this should be brought to the notice of the concerned department and their advice should be sought. At the same time, the water sample should be sent to the district health laboratory/ PHED/RWS lab for bacteriological test.

D. Safe handling and storage of water at the household level

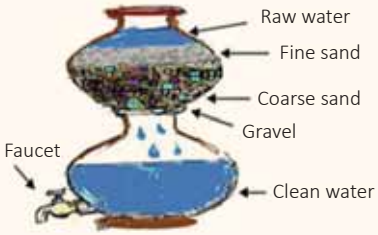
Though water supplied by the water supply scheme is clean and pure, it can get contaminated if it is not stored and handled properly at the household level. Some precautions must be taken while handling water at the domestic level.

Things to remember while handling drinking water at the household level:

- Water normally never becomes stale, however if the storage container is unclean, then even pure water can get contaminated.
- Use a clean ladle to take out the water from any container used for storing drinking water.
- Keep containers at a height where children do not have easy access. Children may inadvertently contaminate the water.
- Always keep containers covered with a proper lid so that water remains safe from dust, insects, ants or any other garbage.
- Earthen pot buried in the ground is hazardous to health.

- Store the water in a cool and dry place so that dust and sunlight do not affect it and it remains safe for drinking.

D.1 Household level water treatment

Water treatment system	About the system	How it works
Household sand filter 	▸ It is made from locally available and inexpensive materials like clay pots or barrels. ▸ The upper pot contains layers of sand and gravel. ▸ The layers consists of 5 cm of gravel, 5 cm of coarse sand and 10 cm of fine sand.	▸ Raw water is poured into the upper pot. ▸ Water passes through layers of sand and all particles in it are filtered out. ▸ Poured water drips into the lower pot.
	▸ The bottom of the upper pot have tiny holes to allow clean water to drip into the lower pot. ▸ The lower pot has a tap to draw off the clean water easily. ▸ The sand and gravel should be changed when the rate of filtration decreases.	
Cloth filtration 	▸ This common water treatment technique is easy to use and inexpensive. ▸ It is very effective against cholera, guinea worm and other disease-causing agents.	▸ Use a large cloth, preferably made of finely-woven cotton. The cloth must be big enough to easily cover the opening of the container once it has been folded. ▸ Fold the cloth at least four times so that there are multiple layers of fabric and place this over the opening of the storage vessel. ▸ Fasten the cloth securely around the rim of the opening and tighten the string. If reusing the cloth, always use the same side up each time. ▸ Filter all water immediately at source as it is being collected. ▸ Always keep filtered water separated from non-filtered water.

Water treatment system	About the system	How it works
		▸ Rinse the filter cloth after each use and give it a final rinse with the cloth-filtered water, and then leave the cloth in the sun to dry. ▸ Clean the cloth regularly using soap and replace it as soon as there are any visible tears or holes.
Solar disinfection 	▸ It is also known as SODIS, solar disinfection relies on energy from the sun to kill pathogenic organisms, especially bacteria. ▸ Ultraviolet light from the sun is an effective bactericide for water.	▸ Collect several bottles (of 0.3 to 2.0 litres) made of clear plastic, remove all labels and wash them thoroughly. Fill the bottles with water of low turbidity and shake for about 20 seconds to aerate the water. ▸ Expose the bottles to the sun by placing them on a roof or rack for at least six hours (if sunny) or two days (if cloudy). ▸ The water is now ready to drink.

D.2 Other chemical disinfection methods

A. Chlorine solution

Chlorine solution, also known as sodium hypochlorite solution or bleach, is easy to produce and is the most affordable and most widely used chemical for household water treatment. It is supplied in bottles and has easy- to- follow instructions on the side of the bottle. Typically, the procedure is to add a capful of chlorine solution to a 25 litre water storage container, then stir and wait for 30 minutes, for the chlorine to work, before drinking. Double dosing is advisable if the water is visibly dirty.

B. Aquatabs

Aquatabs are a specifically formulated and branded solid form of sodium dichloroisocyanurate (NaDCC). NaDCC is stable in a solid form in Aquatabs and that is why Aquatabs have longer shelf lives. It is far easier to store, handle and transport Aquatabs than liquid bleach. One Aquatab contains 67 mg of NaDCC and treats 20 litres of clear water. For visibly turbid water, two tablets per 20 litres are needed. It is very important to mix the tablet/ tablets with the water well and leave the water for 30 minutes for the Aquatab to have its effect, before consumption.

C. Boiling

Boiling is also an alternative treatment at the household level. Boiling is a simple way of killing any ova (eggs), cysts, bacteria and viruses present in the contaminated water. Water should be heated until large bubbles appear on the surface of the water. The disadvantage of boiling

as a treatment method is that it requires large amounts of fuel; so, cost may prevent people from using the method. Also, boiling may give an unpleasant taste to the water, which may be unacceptable and very hot water can cause accidents inside the house. Boiled water can become re-contaminated once it has cooled.

Information regarding government-affiliated innovative technologies on water quality management is available on following web links
1. https://indiawater.gov.in/misc/home.aspx
2. http://www.indiawater.gov.in/MISC/Homebp.aspx

E. Record maintenance and documentation of water quality and safety

The following records need to be maintained by the GP -

Records	Frequency of report generation
O.T. tests and field test consolidated report	Monthly
Sanitation survey report	Twice in a year (before and after monsoon) and whenever required
Chemical contamination reports	Twice in a year (before and after monsoon) and whenever required
Bacterial contamination reports	During monsoon
Report on quantity of bleaching powder (dose) used in case of contamination	Whenever contamination is reported

6.3 Role of GP/sarpanch, swachhagrahi, VWSC in WQM&S

Facilitation	▸ Conduct sanitary survey (source to mouth) involving all the GPS and VWSC members, community leaders, etc. ▸ Identify possible reasons for water contamination and mobilize the community to protect water sources from contamination
Ensuring	▸ Availability of FTK and a technician trained in it at the GP level ▸ Every family is receiving supply of safe drinking water ▸ Water testing in the district/block level laboratory ▸ Regular use of toilet by all at all times ▸ Cleanliness around water sources ▸ Appropriate greywater management
Monitoring	▸ Daily chlorination ▸ Proper storage and use of TCL ▸ A safe distance is maintained between drinking water sources and toilets ▸ On-site inspections and regular water testing ▸ Water test and water quality management records are maintained regularly
IEC	▸ Safe water handling and storage practices ▸ Protecting water sources from contamination ▸ Adopting personal hygiene at the household level

References for further readings

- Training manual on Village water safety and security developed by UNICEF, Maharashtra.
- Active panchayat book II – drinking water in gram panchayat by Ministry of Drinking Water and Sanitation
- Strategic plan 2011 – 2022 ' Ensuring Drinking Water Security In Rural India' by Ministry of Drinking Water and Sanitation https://mdws.gov.in/sites/default/files/StrategicPlan_2011_22_Water.pdf
- Gram panchayat and drinking water by Ministry of Drinking Water and Sanitation

SECTION 3

OPEN DEFECATION FREE PLUS

- Sustaining Open Defecation Free Status – Sustainability (ODF S)
- Operation, Maintenance and Repairs of Toilet Facilities
- Solid Waste Management – Biodegradable and Plastic Waste Management
- Liquid Waste Management – Greywater Management
- Faecal Sludge Management

CHAPTER 7

SUSTAINING OPEN DEFECATION FREE STATUS – (ODF S)

Key discussion points

- Introduction
- Advisory on ODF sustainability (S)
- Construction, repairing and using toilets at household, community and institutional levels
- Retrofitting of toilets
- Water and sanitation facilities for Divyang
- Steps for ODF S
- Roles and responsibilities of sarpanch, swachhagrahis, VWSC, ASHA, AWW, etc. in construction, repairs and use of toilet

7.1 Introduction

Sustainability of ODF status of each village is now a focus of all interventions so that the gains from SBM (G) can be sustained. The motto is 'har koi, har roz, hamesha'. The Government has strongly emphasized the sustainability of sanitation interventions and benefits in all its interventions and engagements with States and stakeholders. Several advisories, guidelines etc. on ODF S have been issued from time to time to support States and Districts in their efforts to ensure sustainability.

Sanitation is a behavioural issue: its social acceptance and internalization by every user is crucial for ODF S. Thus, the role of the community and village stakeholders is important. This chapter discusses the key components of ODF S and the role of village stakeholders in construction, repairs and use of toilet.

7.2 Advisory on ODF S

As per the advisory on ODF S interventions, the following are the three major components that need to be focused upon:

1. IEC-people and community should be engaged using innovative and inclusive IEC interventions for sustaining the ODF outcomes. Human resources involved in IEC planning and delivery should also be involved in sustainability initiatives. Swachhagrahis need to be retained and paid as per SBM (G) guidelines.
2. Capacity-building- trainings for key stakeholders should be organized for various aspects of ODF S such as, training on technology options, masons training, SLWM, organizing various catalytic events and O&M of facilities.
3. Retrofitting of toilets where required, regular use and O&M of toilet facilities.

The details of third component- Construction and retrofitting of toilets, regular use and O&M of toilet facilities are described in the subsequent chapters. The IEC and capacity-building activities are described in the cross-cutting section on IEC.

7.2.1 Training to masons

The technology employed for toilet construction not only ensures its proper functioning but also ensures its sustainable usage. Thus, the role of the technical person (mason) involved in the construction of the toilets becomes critical. In the current context, wherein the coverage of rural sanitation is almost universal, it becomes imperative to re-train/ conduct refresher training for masons to address the issues related to ODF Plus. Refresher training on scales needs to be imparted to masons and in a short period of time to ensure the following:

- Quality of the toilets constructed and the scope of repairs
- Retrofitting of unsafe toilets
- Making dysfunctional toilets functional
- Construction of assets (compost pits, drains, water stabilization tanks, etc.) for ODF Plus.

For this purpose, the Department of Drinking Water and Sanitation has developed an SBM (G) training module and manual (February 2019). This initiative aims at providing technical training to masons on key issues pertaining to ODF, ODF Plus and providing the masons ODF Plus trained certificates.

https://jalshakti-ddws.gov.in/sites/default/files/Technical_Training_to_masons_on_ODF.pdf

7.3 Construction, repair and use of toilets at the household, community and institutional level

7.3.1 Household level toilet facilities

A. Repairing of defunct toilets

The biggest challenge that the area of sustained use of sanitation facilities faces is defunct toilets. The toilets may become defunct due to many reasons: the toilet's age, inferior quality of the

initial construction, inadequate O&M of toilets, less awareness among the users, behavioural issues, etc. Households with such toilets need to be motivated by various IEC activities and mobilizing human resources, into undertaking toilet repairs.

B. Toilet construction for left out families from baseline (LoBs)

The Government has initiated efforts to provide toilet facilities to families left out from the baseline – separated families, migrated families or newly formed families after Baseline Survey , to achieve ODF in the true sense. The GoI has issued advisories to the states to identify such families and motivate them into toilet construction. Accordingly, the states are surveying left out families and promoting the need for toilets among them.

C. Ensuring use of toilets regularly

Common reasons for not using toilets are people's attitudes to sanitation, inadequate availability of water, etc. To sustain the ODF status, the GP should ensure that not a single person from the village is defecating in the open. This can be achieved by strengthening community monitoring systems, implementation of behaviour change communication (BCC) activities and strengthening capacities of influencers and foot soldiers with regard to ODF sustainability components.

7.3.2 Community and institutional level toilet facilities

A. Community level

Public places like market areas, tourist places, temples, bus stands, etc. in the GP are regularly visited by outsiders. Availability of urinals and toilets in such places is crucial to prevent people from defecating in the open. There is a need to first identify these sites and then organize specific activities to motivate the trustees/owner/ management bodies to construct toilets with water supply, organize operation and maintenance systems and ensure the use of these facilities.

B. Institutional level toilet facilities

B1. Water and sanitation in schools and anganwadi

The National Annual Rural Sanitation Survey (NARSS) 2018-19, states that 98.1% schools and 85.7% anganwadis have access to toilet. But in many school the toilets are inadequate in number (ideally- one unit for 20 students plus one disabled friendly/ Divyang unit)[9] and not maintained properly. Baby friendly toilets are also not available in most of the anganwadis. Apart from this, it is observed that many anganwadis in rented buildings do not have toilets. There is no financial provision for operation, maintenance and repair of sanitation facilities.

Annual Status of Education Report Rural [ASER] 2018 indicates that among all rural schools, 13.9 per cent of schools surveyed do not have drinking water facilities, 11.3 per cent of schools have drinking water facilities but do not provide water due to various reasons. Apart from this, about 3 per cent of surveyed schools did not have toilet facilities and 22.8 per cent schools had facilities but were not being not used. In 11.5 per cent of schools, there were no separate toilets for girls. 10.5 per cent of schools have separate toilets but are kept locked and in 11.7 per cent of schools, toilets are not in use. Therefore, efforts need to be taken to ensure that water and sanitation facilities in schools along with separate sanitation facilities for girls exist. Apart from this, provisions for its regular operation, maintenance and repair should be ensured by the GP/ VWSC by strengthening the school management committees.

9 Technical Note Series, School and Anganwadi Toilet Designs by MDWS, 2004

B2. Other institutions

Sanitation facilities are also needed in health centres, village/GP buildings, banks, post offices, etc. to achieve complete ODF status. Presently, sanitation facilities exist in most institutions; however, more efforts are needed in this direction.

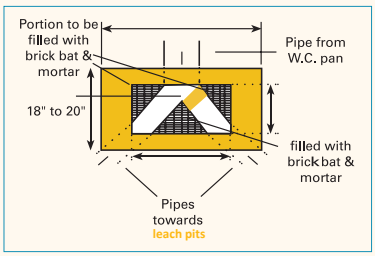
7.4 Retrofitting of toilets

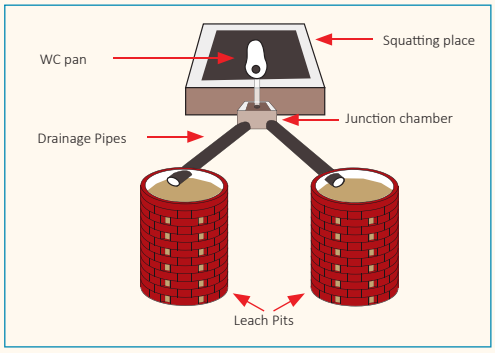
Regular use of toilets can be ensured only when the quality of construction materials is good and construction structure is efficient. Good quality construction can ensure appropriate management of excreta and sustained use of toilets. A 'good quality' construction is toilet one which has (i) a pit/ tank to treat human excreta safely without contaminating the groundwater and (ii) a superstructure. It has been observed that many toilets in rural areas are technically flawed. For example, many toilets have wrongly constructed pits, faulty pipes and chambers or no 'Y' junction, weak or damaged superstructures, pit cover and poor plinth foundation, etc. Sometimes, toilets are constructed within a radius of 10 –15 – metres of a water source. Toilets may have incorrectly built septic tanks. Many toilets may have only one pit which is not suitable in the long term.

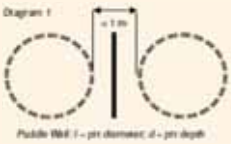
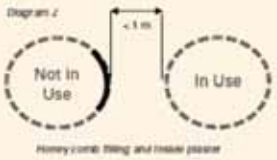
Retrofitting is an action or measure to address a technological gap/problem. Retrofitting for toilets can be done by the addition of improved sanitation structures to existing sanitation systems. The current technology which is affecting a toilet's functionality and its excreta management process including its sanitary status, in other words, is upscaled. Retrofitting of toilets is necessary to end open defecation.

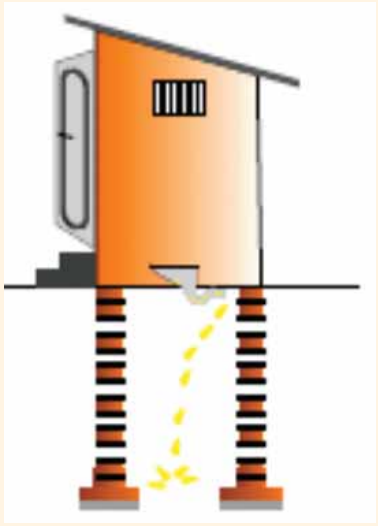
Technological problems can have low-cost and easy solutions. The retrofitting options for each type of problem area is presented in the table below-

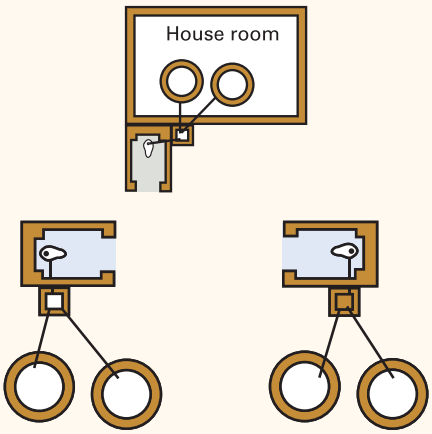
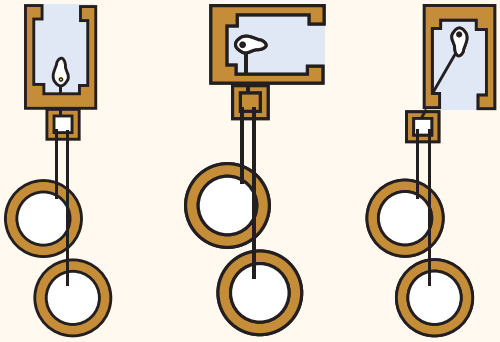
Retrofitting options for each type of aberration

S.No.	Problem area	Possible solutions
1.	Poor junction chamber 	▸ It is the lifeline connecting the pan and the pit. ▸ Junction chamber should be repaired and strengthened. 
2.	Both pipes in junction chamber are open	▸ Close the pipe of the pit which is not in use.

S.No.	Problem area	Possible solutions
3.	Single pit to twin pit 	▸ Stop the use of toilet for two days. Meanwhile, those households whose toilets are being retrofitted can use neighbourhood toilets or community toilets. ▸ Flush the toilet thoroughly with water so that any faecal matter present in the pan or pipe is cleared. ▸ A second pit (01 m x 01m) may be dug at a distance of one metre from the first pit. ▸ The pipe connecting the first pit with the junction chamber may be cut five inches from the rear wall. The cut should be a feet long from the 5 inch mark. Do not interfere with the remaining portion of the pipe. ▸ Y- Junction of 01ft x 01ft (inner size) may be constructed and connected to both the pits. 
4.	Septic tank without soak pit 	Never allow the effluent of septic tanks to flow into an open space or an open drain. This can cause water pollution and spread of diseases. Instead, make a soak pit or leach pit of appropriate volume to accommodate the effluent near the septic tank.
5.	Absence of vent pipe for septic tank 	Always provide a vent pipe to release obnoxious gases from the septic tank. The vent pipe should have a diameter of 3 inches, should be raised above the nearest building structure, have a cowl on the top for proper ventilation and a mosquito screen wrapped around it to shut out mosquitoes.

S.No.	Problem area	Possible solutions	
6.	Twin pit toilet, pits built too close to each other 	Option 1: Construct a puddle wall between the two pits (Wall length = pit diameter; Wall depth = pit depth 	Option 2: ▸ Plaster the inner surface of the pit wall of the 'not in use' (empty) pit ▸ Stop using the first pit, divert the flow of faeces to the renovated pit ▸ Leave the faecal matter in the first pit to decompose ▸ After the matter has decomposed, empty the first pit ▸ Plaster the inner wall adjacent to the first pit 
7.	Shared pit between household toilets due to lack of space	In case the space is less, one or more households can be connected to the twin pits through the Y-junction which should have enough room to accommodate one or more pipes. It should be ensured that all the households use one pit at a time while flushing and cleaning to save water. No acids or chemical products should be used for cleaning. Ash/lime/salt may be used instead.	
8.	Twin pits too close to drinking water source 	▸ Distance less than 10-15 metres from the water source ▸ Dismantle the water source (If polluted) ▸ Saturated (wet) or unsaturated soil –relocate the water source so that it is at a safe distance from the twin pits ▸ The soil type is either fine sand or coarser- should not use the water for any purpose ▸ The pit wall towards the water source may be completely cemented with cement mortar	

S.No.	Problem area	Possible solutions
9.	Pits too deep 	▸ Growth and functioning of excreta- decomposing pathogens (bacteria) are affected if the depth is more than one metre. ▸ Soil should be filled up to one metre from the ground level or a new pit (one metre deep) should be dug. ▸ If possible, abandon the deep pit. A separate leach pit (01 m x 01m) should be constructed beside the existing pit with a junction chamber connecting the superstructure. The new pit should be used with immediate effect. ▸ The abandoned deep pit may be filled up with soil up to one metre from ground level and connect it with the junction chamber with a pipe (4 inch) to make it usable in future and a second leach pit can be constructed within a distance of minimum one metre from the first pit.
10.	Incorrect pits beneath a structure 	▸ The incorrect pits should be abandoned. ▸ Two new pits (1mX1m) should be dug outside the house at least 1.5 m away from the superstructure and connected with a Y-junction (1ftX1ft).

S.No.	Problem area	Possible solutions
11.	No space for a second pit or alternate arrangement for second pit 	▸ A single pit (circular or rectangular) may be dug. The breadth may be expanded but depth should be one metre. ▸ A brick wall completely cemented on both ends separating the pits. The foundation of the wall should be one feet below the earth to so that water does not leak from one pit into another. ▸ If adequate space is not available, location of the pits should be altered depending on the availability of space. Some such alternatives are presented in the diagram below.  Leach Pits at right angle to squatting place  Leach pits in one straight line

S.No.	Problem area	Possible solutions
12.	Pit is cemented at the bottom and in use	▸ If the side walls have holes then they can be used. Once the existing holes have filled up and the waste has been removed, new holes may be made at the bottom too. ▸ If it is completely sealed, holes should be made both at the bottom and on the side walls.
13.	Leach pits without holes 	Case 1: Pits are not having holes and are not in use Holes should be made in both the pits in alternate layers (except in the layer at the bottom and the layer on top) and bottom should be unsealed (if cemented). Case 2: Both the pits are without holes and only one hole is in use The second pit may be modified and holes may be made into it. Once, the first pit is emptied while the second pit is in use, the same process could be repeated for the first pit.
14.	Poor angle of toilet pan trap	▸ Pan traps should have a water seal of 20mm (for rural pans) and 50 mm (for commercial pans). ▸ Pan traps should be repaired and water seals should be checked to ensure if they are appropriate.
15.	Twin pit in high water table areas 	▸ In waterlogged areas the pit top should be raised by 300 mm above the ground. Then the pit should be filled with earth up to the top ensuring that the filled in earth does is one metre deep. The raising of the pit will necessitate the raising of the latrine floor as well. ▸ Other alternative technologies are biotoilet and ecosan toilet. **Biotoilet** is a toilet system that uses the decomposing mechanization to decompose human excretory waste in the digester tank using specific high graded bacteria (aerobic or anaerobic) and further converting the decomposed matter into methane gas, carbon dioxide gas and water. **Ecosan** toilet separate human excreta, urine and water and allows dry decomposition of excreta. This kind of toilet uses a specially designed toilet pan to segregate all types of waste. Maintaining dry excreta and allowing decomposition of dry excreta is an important part of this technology.

S.No.	Problem area	Possible solutions
16.	On-pit toilet	Conversion of an on-pit toilet to an off-pit toilet by digging two pits off-site and connecting them with a Y-junction (junction chamber).
17.	Pit toilets with vent pipes	▸ The gases produced during decomposition in the pit are absorbed by the earth around the pit through holes, thus leaving the toilet odourless. Vent pipes are not required. ▸ Vent pipes are breeding grounds for mosquitoes and flies. ▸ Vent pipes need to be removed/cut and sealed to ensure oral-faeces safety.

Information regarding government-affiliated innovative technologies on sanitation is available on following web links

1. https://indiawater.gov.in/misc/home.aspx

2. http://www.indiawater.gov.in/MISC/Homebp.aspx

3. A film on retrofitting has been developed which will be shared.

7.5 Water and sanitation facilities for Divyang

Persons with disabilities have the same rights as any person, including the right to clean water, hygiene and sanitation, but they may also have specific needs. The SDGs explicitly promote disability inclusion – they aim at ensuring universal access to water and sanitation by 2030. Water, Sanitation and Hygiene programmes need to support Divyang / persons with disabilities (PwDs) to claim their rights, by enabling their active participation in policy and decision-making and increasing their visibility. The provision of safe, inclusive and accessible water and sanitation services ensures that everybody benefits from improved health outcomes. It enhances the quality of life of people with disabilities, and reduces the workload of families involved in care-giving.

As per the Rights of Persons with Disabilities Act, 2016, a person with disability is defined as "a person with long term physical, mental, intellectual or sensory impairment which, in interaction with barriers, hinders his/her full and effective participation in society equally with others

7.5.1. Toilets and water supply in schools,community and households for persons with disabilities

The main adaptations to water and sanitation facilities that need to be made for three categories of persons with disabilities are:

- Children and adults with visual impairment (low vision and blind): **special grips and guiding systems as well as adequate lighting**
- Children and adults using mobility aids such as wheelchairs or crutches: **provision of ramps, wider doors and special grips or foldable seats**
- Children and adults with missing or paralysed arm(s): **lids, taps, and knobs that can be opened with one hand or operated with the feet and are not too heavy**

7.6 Steps for ODF S – Summary

Project	Steps	
Gap filling – Toilets for all	✓ Filling any gap in achieving or sustaining the ODF status by supporting a household that do not have a toilet to build one ✓ Conversion of shared toilets to individual toilets	✓ Conversion of dysfunctional toilets to functional ones ✓ Geo tagging of assets created under SBM (G)
Retrofit toilets	✓ Identify households that require toilet retrofitting ✓ Implement IEC plan ✓ Identify financing opportunities	✓ Continuous training of Masons ✓ Final Implementation
Implement second verification	✓ Identify villages due for second verification of ODF status ✓ Engage a team for the second verification	✓ Assign blocks to the district SBM team and monitor progress
5 key IEC messages	✓ Identify the modes of dissemination of messages ✓ Prepare an IEC roll out plan	✓ Assign tasks to the team and monitor progress
Building community sanitary complex	✓ Identify lands with the support of GPs ✓ Secure funds, materials, water supply, power connection	✓ Organize O&M through the corporate sector/through local entrepreneurs/ GP
Capacity strengthening	✓ Identify stakeholders, Swachhgrahi / Sarpanch/Sachiv, who need reorientation trainings ✓ Develop a training calendar and training materials in discussion with training agencies	✓ Organize trainings and field visits ✓ Monitor trainings to ensure that the training yields desired outcomes

7.6 Roles and responsibilities of sarpanch, swachhagrahi VWSC, ASHA and AWW, etc. in implementation of this programme

No.	Role	Functions
1.	Facilitation	▸ Organization of the planning process ▸ Identification of households with defunct toilets, additional families/migrated families/families with no toilets ▸ Identification of institutions having defunct toilets/no toilets/ toilets not being used ▸ Selection of swachhagrahis and setting up nigrani samitis

No.	Role	Functions
		▸ Identification of households with Divyang /persons with disabilities and (i) supporting them in make their toilets accessible to them (ii) finalizing f provisions regarding sanitation facilities for Divyang in schools and at the community level ▸ Organization of competitions at the household, community and ward levels for maintaining ODF S sustainability and promote ownership
2.	IEC/BCC	▸ Formation of a GP/VWSC/ core group for the formulation of social rules for sustained use of toilets, and monitoring if all members are conforming to these rules ▸ Facilitating SHGs, youth groups for working as service providers ▸ Organization of activities in alignment with the local context: good morning squads, home visits, mass media, communication events, etc. Ensuring involvement of children in these activities
3.	Ensure	▸ Motivate for construction of toilets in additional families ▸ Repairing and retrofitting of toilets ▸ Use of toilets by all and at all times ▸ Water and Sanitation facilities in community buildings, schools and anganwadis ▸ At least one community toilet for floating populations ▸ Eradication of OD sites: Planting trees in an area/ beautifying the area
4.	Convergence	▸ Coordination with village-level government functionaries for undertaking various ODF S activities in the villages on important days like Swachhata Diwas, Village Health Sanitation Nutrition Day (VHSND), etc. ▸ Mobilization of the community for construction and repair of toilets at individual, school, anganwadi and community levels

References for further readings

- ODF Booklet, Department of Drinking Water and Sanitation
- Guideline on ODF S issued by MDWS on 15 December 2016
- Training manual on sustainable sanitation developed by MDWS and UNICEF
- Training manual on ODF S under SBM (G) developed by Water and Sanitation Department, Government of Maharashtra, August 2018
- Technical Training Manual for Masons developed by MDWS , February 2019
- Presentation on Retrofitting strategy for ODF in National ODF Sustainability Workshop –New Delhi 19 December 2017
- http://disabilityaffairs.gov.in/upload/uploadfiles/files/WASH%20Practitioners%20Manual-Samarthy.pdf
- https://www.unicef.org/disabilities/files/WASH_Disability_Inclusion__Practices__programming_note_-_Draft_for_review.pdf
- https://swachhbharatmission.gov.in/sbmcms/writereaddata/images/pdf/technical-notes-manuals/PWD-Guidelines.pdf

CHAPTER 8

OPERATION AND MAINTENANCE OF TOILETS

Key discussion points

- Introduction
- ODF S advisory
- Operation and maintenance of toilets- issues, reasons, solutions and technical options for O&M of sanitation facilities.
- How to set up a system for O&M of toilet facilities
- Roles and responsibilities of sarpanch, swachhagrahis, VWSC, ASHA and AWW etc. in implementation

8.1 Introduction

Regular maintenance and periodic repairs of individual and institutional sanitation facilities is a critical component of Sujal and Swachh Gaon. Inadequate O&M and repairs of sanitation facilities may lead to temporary/permanent breakdown of the facility, hampering its sustainable use. Therefore, O&M of toilets is necessary for sustaining the ODF status.

8.2 ODF S advisory

Following are the key advisory:

- As per the ODF S advisory, O&M of village level sanitation facilities is the responsibility of GPs.
- The block and district are responsible for setting up systems for O&M and building capacities of these systems.
- District level activities need to be undertaken for selecting service providers and building their technical skills for O&M.
- IEC activities are significant for effective O&M of sanitation facilities and their sustained use.

8.3 Operation and maintenance of toilet facilities

Regular O&M of individual and community toilet facilities in rural areas require understanding of the issues, reasons, solutions and technical options for O&M of the system.

A. Maintenance of toilets

Issue	Reasons for inadequate maintenance	Solutions
▶ Daily and annual maintenance activities may not be done. ▶ Proper methodology is not followed. ▶ Required material for maintenance is not available.	▶ Insufficient technical information for daily and annual maintenance. ▶ Non-availability of service providers	▶ Organization of IEC/ BCC activities. ▶ Empanelment/ procurement of service providers

Important pointers for regular O&M

Regular maintenance

- Keep sufficient water stored near the toilet so that every user can get the required quantity of water at any time.
- Instruct people on how to use toilets efficiently. For example, tell them to pour a little water into the pan before use to ensure that the excreta does not stick to the pan.
- Do not use too much water to flush down the excreta.
- Keep the door of the toilet properly greased and painted to increase its durability.
- Ensure that water is not accumulated inside the toilet squatting area.
- Use a long-handled brush with bristles on both sides for cleaning the toilet pan.
- Do not use acid/ detergent for cleaning the pan.
- Keep the area around the pit clean.
- Make sure that the door opens on the outside to avoid rotting of the wooden door.
- Ensure that the finishing of toilet chamber is done properly to avoid clogging of excreta.
- Do not install a vent pipe for twin-pit latrines. Vent pipes are to be installed only for septic tank latrines and for DRDO's bio-digester latrines.
- Make provision for a second pit in case of a single pit toilet. Ensure that the water seal is fixed properly to prevent foul odour.

A. Annual maintenance

- Make sure that the door, lock, roof, walls, pit, chamber, window, etc. are in good condition.
- Open the pit after wearing gloves and mask and check how much of the pit is filled.
- In case of single pit toilets, dig a second pit and fix chamber for diversion of waste to the second pit.
- Make sure that the rainwater does not enter the pit.
- Repaint faded walls.
- Use sufficient water to avoid a foul smell.

B. Filling of pit

Issue	Reasons for non-emptying	Solutions
▶ Inadequate awareness about pit emptying methods. ▶ Non-use of a filled up pit.	▶ Inadequate technical information about pit emptying ▶ Misconceptions/stigma about pit emptying ▶ Inadequate service providers for pit emptying	▶ Convincing the concerned families of the necessity of a second pit construction (in case of single pit latrines) ▶ Spread of technical information through IEC/IPC activities. ▶ Demonstration of correct pit emptying method

Methodology to empty the pit

- Empty the first pit one year after the changeover of pits.
- Take out the manure in summer.
- First remove the cover of the filled leach pit.
- Observe the manure carefully.
- Remove any roots of a nearby tree that may be growing in the pit.
- Take out the manure with a spade and a ghamela (tray container).
- Do not remove the manure from the ground level when the manure level decreases. Safely get inside the pit and remove the manure. While doing so, wear shoes and gloves.
- Fix the pit lid properly after emptying the pit and spread soil over it.

C. Filling of a soak pit

Issue	Reasons for inefficient management	Solutions
▶ Septage from septic tanks is discharged into the open	▶ Less awareness regarding the impact of inappropriate septage management ▶ Inadequate technical information ▶ Negative mindset of people	▶ Organization of IEC/BCC activities ▶ Digging soak pits for septage management by engaging the GPs

Construction of soak pit

1. The dimensions of the soak pit should be 3ft breadth, 3 ft length and depth of 2.5 ft near the toilet and 3 ft on opposite side
2. Fill 1/3 of the pit by small stones and then medium size stones. The topmost layer should again be of small stones. Do not fill the soak pit completely
3. Bring the pipe from chamber till the center of the pit and cover it with stones
4. Fix a pot having a hole of 6-8 inch diameter in the top most layer
5. Fill the pot with grass and coconut peels and make sure that the waste from the pipe falls directly into this pot

Desludging of septic tanks

Issue	Reasons for non-desludging	Solutions
▶ Inadequate information about Maintenance and Repair of septic tank type toilets ▶ Technically inappropriate construction ▶ No desludging, transportation and treatment	▶ Non-availability of van for desludging ▶ Non-availability of affordable services of desludging ▶ Non-availability of facilities for end treatment of sludge	▶ IEC activities for maintenance and desludging of septic tanks ▶ Necessary repairs of tanks ▶ Availability of affordable services for faecal sludge management

Regular maintenance of the septic tank

- Use bleach based mixture for cleaning the toilet pan.
- Use a brush having two side bristles for cleaning the toilet pan.
- Make sure that water from bathroom, domestic water and rainwater does not enter the septic tank.
- Cover the vent cap with a net to prevent mosquitoes from entering the tank, which can be troublesome for the people.

Methodology and system of desludging

- The septic tank needs to be desludged every 3-5 years based on the size of tank
- Sludge pump/vacuum pump is necessary for desludging
- Such facilities are not available in rural areas as they are costly
- Technologies like Gulper, MAPET are available in the market and can be used for emptying septic tanks
- A Vacuum pump may be purchased if the number of septic tank type toilets are high

D. Community, institutional and shared toilets

Issue	Reasons	Solutions
▶ Lack of maintenance and repairs ▶ Inadequate availability of water ▶ Lack of hygiene- due to incorrect usage of toilet facilities	▶ Lack of ownership ▶ Lack of system for O&M ▶ Inadequate funds for O&M	▶ Maintenance of toilets by families in rotation ▶ Appointment of a caretakers/ service providers for O&M ▶ Organize IEC activities ▶ Levying charges on users ▶ The GP to add a component of O&M of community, institutional and shared toilets in the annual budget

Pointers for O&M of community, institutional toilet

- O&M by GPs with funds available at the panchayat level
- Ensuring availability of water
- Availability of material for cleaning
- Monitoring of regular cleaning
- Availability of service providers for regular O&M

8.4 How to set up a system for O&M of toilet facilities

The SBM (G) has led to a huge increase in the number of toilets and their users. This increase has foregrounded the need for regular O&M of individual, institutional and public toilets. Timely availability of service providers for O&M of toilets is a critical challenge in this regard. Therefore, efficient systems need to be developed for regular O&M of toilets in rural areas.

For O&M of Individual Household Latrines (IHHLs), users may need appropriate cleaning material and relevant equipment, along with the relevant know-how. They will also need the services and know-hows for emptying pits in future. In case of public toilets, a system and a service provider for their O&M will be required.

The GP and VWSC should arrange for materials, services and know-hows for O&M of toilets. Capable and willing- organizations and individuals can provide services for O&M at the village community level. These O&M services may also be viewed as opportunities of employment and income-generation. Innovative O&M systems can be converted into income-generation models for SHGs, youth groups, CBOs, unemployed individuals and others. This will create a win-win situation where the needy villagers will get entrepreneurship opportunities and the services for O&M of toilets will be locally available at affordable rates. The GP can play a role in striking a balance between the demand and supply of O&M services at the village level.

8.5 Roles and responsibilities of sarpanch, swachhagrahi VWSC, ASHA and AWW, etc. in implementation of this programme

No.	Issue	Strategy pointers
1.	Nurturing a sense of ownership in the community	▸ Identify activities for IEC/SBCC and issues to be addressed through those ▸ Incorporate these activities in the IEC plan ▸ Identify the facilitators for every IEC activity ▸ Undertake capacity-building activities ▸ Implement planned activities as per the schedule
2.	Strengthening the existing systems	▸ Set up required committees ▸ Assess the capacity of village-level institutions for O&M ▸ Build capacities of these institutions through IEC activities, meetings, CB activities, etc.
3.	Selecting service providers	▸ Select service providers for O&M of toilets. SHGs, youth groups, CBOs may be motivated to work as service providers ▸ Organize capacity-building activities for the service providers
4.	Disseminating technical information	▸ Disseminate communication material for IEC/ BCC on technical information regarding O&M of toilets ▸ Build capacities of the stakeholders through trainings, workshops, demonstrations, exposure visits, etc. ▸ Provide necessary guidance to the concerned village/GP
5.	Funding availability	▸ Prepare a budget for O&M of public toilets ▸ Decide the user charges amount and collect charges accordingly ▸ Provide guidance to the village/GP on financial management
6.	Monitoring and follow-up	▸ Set up a system for monitoring activities

References for further readings

- Training manual on sustainable sanitation developed by UNICEF and the MDWS
- Training manual on ODF S under SBM (G) developed by the Water and Sanitation Department, Government of Maharashtra
- Technical training manual for masons developed by the MDWS

CHAPTER 9

STATUS AND OPERATIONAL PLAN FOR SOLID AND LIQUID WASTE MANAGEMENT

Key discussion points

- Concept, importance and principles of solid and liquid waste management (SLWM)
- Components of SLWM
- Technology options for biodegradable waste management
- Objective, provisions and process of the Galvanizing Organic Bio-Agro Resources Dhan (GOBAR-DHAN) scheme

9.1 Introduction

The solid and liquid waste generated in rural areas is predominantly biodegradable- it has become a major challenge in terms of environment cleanliness and a threat to public health. It is estimated that every day approximately 0.3 to 0.4 million metric tons of solid waste (biodegradable and recyclable) and 15000 to 18000 million litres of liquid waste (greywater) are generated in rural areas. The waste generated, if not treated and managed scientifically, adversely impacts public health and environment. Thus, environmental sanitation is important to improve the quality of life in rural areas.

SLWM is one of the key components of the ODF Plus initiative under SBM (G). As villages of the country are fast becoming ODF, the need of hour is to kick-start ODF Plus interventions for transforming these villages into "Sujal and Swachh Gaon". Thus, to achieve this and harness the benefits of environmental sanitation it is important to mobilize the community for effective solid and liquid waste management.

This chapter introduces SLWM and various treatment technologies for biodegradable waste management which can be applied at household and community levels.

Waste

Waste is any item that is beyond use in its current form and is discarded as unwanted. It can be solid or liquid and accordingly the management methods may vary.

Solid waste

Non- biodegradable and biodegradable materials that are produced by households, commercial and industrial establishments and have no value to the owners are defined as garbage or solid wastes.

Liquid waste

Used and unwanted water is called waste water or liquid waste.

9.2. 4Rs of waste management

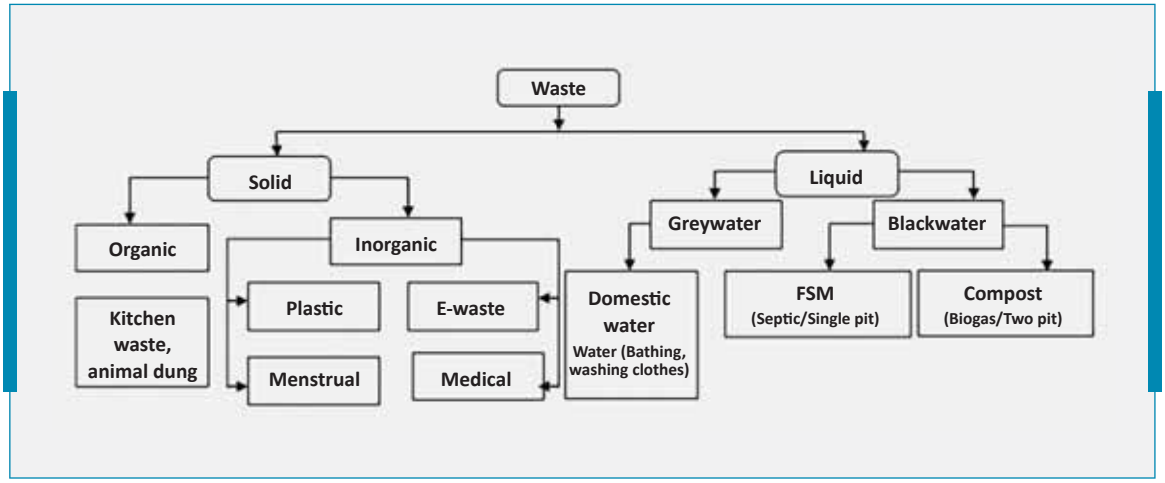
In waste management, the 4Rs refers to reduce, reuse, recycle and recover. This helps to prevent and minimize waste. The 4Rs are explained in the following chart.

Waste

Reduce	**Reduce or prevent generation of waste** ▶ Carry one's own cloth bags or use paper bags ▶ Buy durable goods ▶ Avoid products with excessive packaging ▶ Use water as per requirement only (e.g. closing the water tap while brushing)	**Reusing things before they are recycled or disposed of** ▶ Reuse jars, bottles or containers for storage ▶ Use old newspapers for making paper bags, etc. ▶ Use rechargeable batteries ▶ Use greywater with minimal treatment for irrigation, gardening, etc.	Reuse
Recover	**Prepare and treat waste materials in order to generate energy** ▶ Use discarded material for art and crafts etc. ▶ Recycle plastic into storage bottles, toys, buckets and other usable items ▶ Recycle newspaper, old books, glass, wood, etc.	**Physical or chemical alteration of waste into a new item** ▶ Transform waste into energy ▶ Generate electricity ▶ Use waste as fuel substitute ▶ Minimize the demand of fresh water for domestic use.	Recycle

9.3 Components of waste management

Components of waste management are given in the following diagram



9.4 Solid waste management

9.4.1 Classification of solid waste

Solid waste can be further classified as organic and inorganic for management purposes.

A.	Biodegradable- Wastes that can be decomposed completely by biological processes in the presence or absence of air are called biodegradable	
	Category	**Types of waste**
1.	Domestic waste	Kitchen waste, leaves, egg shells, vegetable peels, meat, bones etc.
2.	Cattle Dung and slaughter waste	Wastes from the animal husbandry sector consist of animal dung, urine, leftover fodder, slaughter waste such as blood, bones, feathers, etc.
3.	Agriculture waste	Crop residues like paddy straw, wheat straw, stalks of oilseeds, pulses, etc.
4.	Commercial/ rural industrial waste	Waste generated from meat shops, food waste of hotels, waste generated from agriculture processing units, like rice and flour mills, And waste generated from the shelling of pulses

B.	**Non-biodegradable -** Waste which cannot be decomposed by biological processes is called non-biodegradable waste. These are of two types:	
	B1. Recyclable waste - Waste that has economic value and can be recovered and reused along. This type of waste can also generate energy. E.g. newsprint papers, grocery bags, corrugated (packing boxes), jars, plastic bottles, aluminium cans, tin cans, etc.	B2. Non-Recyclable - Waste that does not have economic value and are not fit for recovery E.g. soiled Paper, laminated papers, waxed cardboard, cans used for chemicals or paint, etc.

9.4.2 How to manage biodegradable waste at the village level

Solid waste should be managed at the household or community level. Waste generation should be zero or minimal at the household level so that there is minimal waste at the community level. In cases where it is difficult to manage waste at the household level, it needs to be transported to community bins or treatment plants. Solid waste management includes the following key steps:

Step 1. Identify households and bulk waste generators (hostels, markets, marriage halls, restaurants etc.) and quantify the waste generated.

Step 2. Village resolution on biodegradable waste and cattle dung

- Mandatory waste segregation at the source
- Mandatory cattle dung management

Step 3 Conveyance plan

- Villages to develop conveyance plans to collect waste from households and bulk generators regularly

Step 4A. Biodegradable processing plan

- A household with cattle must either feed biodegradable waste to the cattle or mix the waste with the cattle dung for composting
- A household without cattle are encouraged to have on-site compost pits
- Village-level composting units should be implemented for the remaining households and bulk waste generators

Step 4 B. Cattle dung processing plan

- Build dung pits or cover the pits with dung on all sides to prevent run-off
- Implement biogas unit with the support of the GOBAR-DHAN scheme.

Step 4 C Non-biodegradable processing plan

- Create a storage place and store non- biodegradable and hazardous waste in closed bags/bins
- Stored waste will be collected by the nearest material recovery facility periodically

Step 5 Determine suitable business models

Identify revenue sources

- Waste collection fee
- Sale of compost
- Creation of a village fund

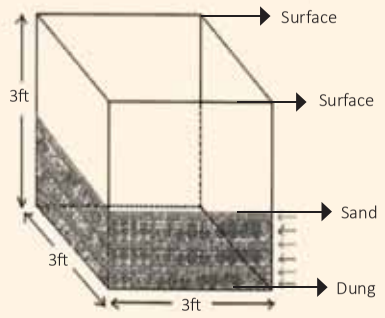
Identify operational cost

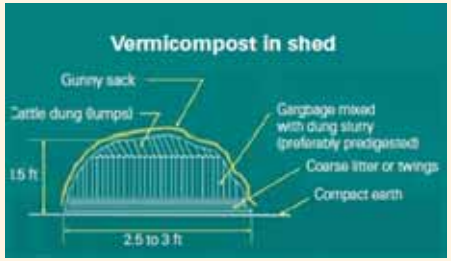
- Collection cost
- O&M cost of compost pits and storage of non-biodegradable waste
- Other management costs

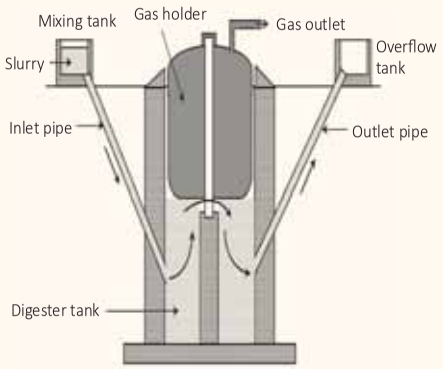
Decide the business model

- Fee structures for APL/BPL families
- The village manages solid waste by itself or has an external source to manage the waste

9.4.3 Treatment technologies for biodegradable waste

Technology	Applicability	Action	Construction methodology	Limitations
Composting technologies for households				
Underground lined manure pit or garbage pit  3ft x 3ft x 3ft	▸ Rural areas with low rainfall ▸ Houses with an open space of about seven square metres. ▸ Houses with no cattle or with a single cow or bull	▸ Since construction of compost pit does not include any skilful job it can be done with the help of a local labourer ▸ Even the house owner can make this pit with the help of some technical know-how	▸ Dig two pits of 1m x 1m x 1m dimensions ▸ Make a single layer of broken bricks at the bottom ▸ Make a ridge with the help of mud-cement on the periphery of the pit and make it compact by light ramming ▸ Manual labour (of two days) is required to dig the pit. Note – In the case of underground unlined manure pit or garbage pit, the dimensions should be – 1m (depth) x1.5m (width) x 3 m (length)	Not suitable for heavy rainfall areas and rocky terrains
Overground brick lined manure pit or garbage pit (NADEP) 		▸ An unskilled labourer for a day and a skilled labour for half a day are required ▸ Approximately 400 bricks, ½ bag cement and five cubic feet of. sand are required		▸ Two pits are required for use in rotations since it takes three months to convert the garbage into compost. The construction of two pits increases the cost ▸ Large quantities of soil and water are needed which can be difficult to transport in certain areas

Technology	Applicability	Action	Construction methodology	Limitations
Vermicomposting 	In areas with high and low rainfall or mini- scale commercial areas	Three to four labourers and a trained supervisor to monitor the construction process are required	▸ The site should be protected from direct sunlight and should not be in low-lying areas ▸ Proper ramming of soil or preparation of platform is required before the preparation of vermi composting beds ▸ Thatched roofs/tin sheds on bamboo/ metal poles with proper slope to drain rainwater and adequate ventilation are needed ▸ The biodegradable waste should be pre-digested in a separate bed before transferring it to the treatment beds ▸ Make a basic bed of 24 cubic feet(L=8ft,B=3ft,Ht =1ft) with one brick (9 inch x 4 inch x 3 inch) containment all-round the bed ▸ Alternatively, brick tanks of same dimensions having 2 feet height may be constructed. With this, the worms will not escape into the surroundings. The worms are also protected from natural enemies. The tank may easily be covered with a wire mesh	▸ Lack of organized marketing ▸ Resistance of the farming community to new processes ▸ Lack of demand of vermi compost (manure) from farmers ▸ Seasonal variation in the composting process and in production due to temperature and moisture differences

Technology	Applicability	Action	Construction methodology	Limitations
Biogas 	Applicable for household, community and commercial establishments	▸ For domestic biogas unit a team of three personnel with one trained mason or supervisor and two unskilled labourers are required ▸ Such a team can accomplish the construction activity in 5 to 6 days	There are many designs and models of biogas plants in operation with each having special characteristics: Floating –drum plant with a cylindrical digester (KVIC model) Floating dome plant with a brick reinforced moulded dome (Janta model) etc. The details of a few models can be referred to from the links below- https://sswm.info/sites/default/files/reference_attachments/AFPRO%202005%20Deenbandhu%20Model%202000%20Biogas%20Plant.pdf https://www.ircwash.org/sites/default/files/352.1-87AF-3568.pdf	Gas accumulation rates are slower than rates of use

9.5 GOBAR-DHAN

The Government of India launched the 'Galvanizing Organic Bioagro Resources Dhan' (GOBAR-DHAN) scheme in Feb 2018. The scheme is being implemented as part of the SBM (G). The objective of the scheme is to ensure cleanliness in villages and generate wealth and energy by converting cattle dung and solid agricultural waste into compost and biogas and an overall improvement in the lives of villagers. GOBAR-DHAN scheme is crucial for supporting villages in management of biowaste.

The intended impact of the scheme is to attain cleaner villages through solid waste management, increased rural income and employment and reduced environmental impact.

9.5.1 Objectives of the scheme

a. Reduce waste from villages and maintain overall cleanliness by providing improved sanitation facilities.

b. Promote the use of rich manure sources, like digested slurry from biogas plants, in the farm for supplementing chemical fertilizers.

c. Decrease sanitation related diseases by reducing waste stagnation in villages and improving indoor air quality which is affected by burning dung cakes and firewood.

d. Develop villages which can generate clean energy on their own by harnessing biowaste to generate bioenergy. Generation of clean energy will also reduce burning and dependence on forests.

e. Provide entrepreneurship opportunities to rural youth by making them more skilled and providing potential green jobs such as collection of waste, transportation to treatment plants, management of plants, O&M of plants, sale and distribution of biogas and bioslurry generated, etc.

f. Provide cleaner and cheaper fuel like biogas/bio-CNG for cooking and relieve women from collecting firewood/ making dung cakes.

9.5.2 Target

GOBAR-DHAN scheme proposes to cover 700 projects across the country by 2023-24. The states may choose to develop at least one project per district or as many viable projects as possible to achieve effective biowaste management in villages.

The programme will be funded under the SLWM component of SBM-G as per existing guidelines of the SBM (G). The total assistance under SBM (G) for SLWM projects has been determined on the basis of the total number of households in each GP: a maximum of INR 7 lakh for a GP having 150 households or less, a maximum of INR 12 lakh for a GP with 300 households or less, a maximum of INR 15 lakh for a GP with 500 households or less and a maximum of INR 20 lakh for GPs with more than 500 households.

However, states shall have the flexibility to provide additional funds to any GP based on viability, under the scheme, through convergence with other central/state schemes.

9.5.3 Benefits of the scheme

- Income-generation: The scheme will generate an alternate source of income for the farmers of rural India.
- Compost fertilizer: The farmers will be able to easily use available compost fertilizers for their fields and will also learn to set up their own compost plants.
- Safe power generation: The scheme involves generation of power using biogas and the biogas can further be used for generating electricity for the villagers.
- Employment generation: The initiative will help generate community-level employment.
- Better standard of living: The scheme will be helpful in changing and improving the condition of living in rural areas and will usher in new developments at the village level.
- Infrastructure development: Under the scheme, the Government will develop the available infrastructure in order to promote development of the villages so that the overall GDP of the economy rises.
- Green India, Clean India (eco-friendly): The scheme is designed to transform waste into something useful in an effective manner.

9.5.4 Implementation process of GOBAR-DHAN

- The DWSC headed by the district collector/district magistrate shall be responsible for final approval of projects, implementation and monitoring.
- The entity will set up the project as per the prescribed timeline.
- The entity will ensure deployment of staff needed for construction and management of the project.
- The entity will select collectors of waste preferably from the local population. They will be provided basic training in waste management including collection, segregation and transportation, through a state approved agency/KRC. The training plan will be decided in consultation with the State Technical Advisory Committee (STAC).
- Incentives will be released to the entity per prescribed guidelines/the GoI policy.
- Functioning of the project will be monitored periodically by the District /State/Centre.

9.5.5 Four models

The following four models are recommended for implementation under the scheme and shall be eligible for incentives. States are to use their discretion in selecting the right model/s or a combination of models for the interventions to be sustainable.

Model A	Model B	Model C	Model D
Gram panchayat	SHG federation	Bulk waste generator/ entrepreneur	Any eligible enterprise
Support by technical agency ✓ Lease land/ GP land ✓ Collection of waste from project villages is mandatory	Support by technical agency ✓ Own/Lease/ GP land ✓ Collection of waste from project villages is mandatory	Must engage a technical agency if the entrepreneur has no experience ✓ Own land/ lease land ✓ Collection of waste from project villages is mandatory	✓ Own/lease land ✓ Waste from project villages or other
✓ Supplies to the village at cost/ commercial sale/ buy-back	✓ Supplies to village at cost/ commercial sale/ buy-back ✓ North-Eastern and hill states may be exempted so that they can to construct habitation level biogas plants under the scheme and not only larger community level plants.	✓ Self-consumption/ supplies to village at cost/ commercial sale/ buy-back	✓ Sells output to fuel companies
Incentive:			
✓ 100 per cent of the plant cost or as per the SBM (G) SLWM slab as indicated below, whichever is less. Plant serving GPs with total funds available: 150 HHs – INR 7 lakh 300 HHs – INR 12 lakh 500 HHs – INR 15 lakh > 500 HHs – INR 20 lakh ✓ 25 per cent of the incentive shall be made in advance, at the time of the DWSC approval ✓ The rest is to be paid a month after plant is operational ✓ Ten per cent of the total incentive released can be used as turnkey fee to pay the technical agency	✓ 75 per cent of the plant cost or as per the SBM (G) SLWM slab as indicated below, whichever is less. Plant serving GPs with total funds available: 150 HHs – INR 7 lakh 300 HHs – INR 12 lakh 500 HHs – INR 15 lakh > 500 HHs – INR 20 lakh ✓ 25 per cent of the incentive shall be made in advance, at the time of the DWSC approval ✓ The rest is to be paid one month after plant is operational ✓10 per cent of the total incentive released can be used as turnkey fee to pay the technical agency	✓ 50 per cent of the plant cost or as per the SBM (G) SLWM slab, whichever is less. ✓ Plant serving GPs with total funds available: 150 HHs – INR 7 lakh 300 HHs – INR 12 lakh 500 HHs – INR 15 lakh > 500 HHs – INR 20 lakh ✓ Incentive is back-ended ✓ Ten per cent of the total incentive released can be used as turnkey fee to pay the technical agency	✓ No financial incentive ✓ States may facilitate purchase or buy-back through PSUs ✓ The GoI has no role

Case study: Income generation from waste

Banawadi gram panchayat, District, Satara, Maharashtra with around 12,000 population, generated almost a ton of wet waste every day but had no place to dispose of it. Encouraged by the Rural Development Officer, the GP decided to set up its own vermicomposting unit. From renting a local farmer's land and streamlining waste collection system to setting up a shed and composting plant, the GP invested around INR 2,80,000. The compost and vermi-wash are currently marketed under the name of Banawadi. Local waste pickers are included in the system as well. The demand is picking up. With an annual turnover of INR 7,20,000, the investment cost has been recovered and the plant has become a source of income for the GP. A significant number of villages are now getting triggered after witnessing the Banawadi example, and evolving their own waste management systems.

References for further readings

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2. Guidelines on SLWM issued by MDWS on 7 July 2014
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4. http://www.swachh.mp.gov.in/material/SLWM_2.pdf
5. Technological options for SLWM in rural areas developed by Government of India
6. Source book on SLWM in rural areas developed by the Government of India
7. Establishment and Management of Community Sanitary Complexes in Rural Areas A handbook by MDWS
8. https://www.researchgate.net/publication/268079134_Plastics_waste_management_in_India_An_integrated_solid_waste_management_approach

11. https://swachhbharatmission.gov.in/.../Download.aspx?...SLWM%20tech%20manual....
https://swachhbharatmission.gov.in/SLRM/Download.aspx?FileName...pdf

CHAPTER 10

PLASTIC AND MENSTRUAL WASTE MANAGEMENT

Key learning points

- Menstrual Waste Management (MWM) and disposal options for menstrual absorbent
- Technologies for plastic waste management
- Steps for implementing solid waste management activities
- Roles of the sarpanch, swachhagrahi, ASHA, AWW, VWSC and village level stakeholders in solid waste management

Background

This section states in detail the need, importance, components and technologies for menstrual waste management and plastic waste management.

10.1 Plastic waste management

Plastic pollution adversely affects the earth's environment, that is, the forests, the oceans, drinking water, soil, animals and human beings. Therefore, use of plastic needs to be reduced greatly and proper plastic waste management needs to be ensured. 20 Indian states/UTs have declared a complete ban on plastic and five states observe a partial ban as of April 2018.

Impact of plastic waste on the environment and on public health:

- Being non-biodegradable, plastic keeps on accumulating in the environment leading to unclean environment.
- Plastic pollutes water and land resources as it is prevents adequate ventilation and (solar) heating.
- Plastic leads to the death of animals, birds and aquatic animals when they consume it and this results in ecological imbalance.
- Disposal of plastic by the method of incineration/burning leads to air pollution

- Leading to severe respiratory disorders by inhaling toxic gases generated by the burning of plastic

Plastic use can be controlled by applying the 4Rs of waste management:

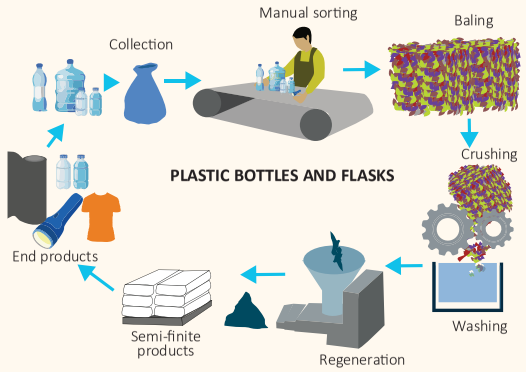
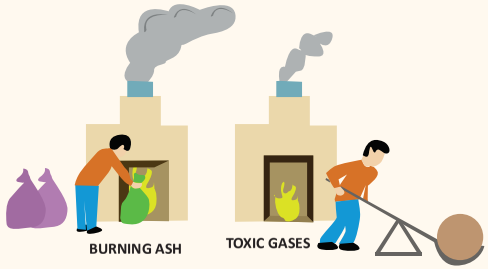
- Reduce: Carry own cloth or paper bags. Avoid products with lots of plastic packaging etc.
- Reuse: Reuse plastic jars, bottles or containers for storage.
- Recycle: Recycle plastic by remoulding it into storage bottles, toys, buckets and other usable items
- Recover: Use waste(that may contain plastic) as a fuel substitute (RDF)

The technologies for plastic waste management are presented below-

Things that can be recycled

Waste	Can be recycled into
Various bottles (bottled water, soft drinks, juice), cables, clothing	T-shirts, carpets, binders, pillow fillings, etc.
Containers for food or household products (oil, detergent, garbage bins, tubes and pipe water, gas), etc.	Oil and detergent containers, binders, fences, plastic lumber, etc.
Containers for household cleaning or personal care products (bleach, shampoo), mineral water, food boxes, blinds, cheese and meat packaging, credit cards, bottles, etc.	Coating, pipes, car parts, road cones, signs, construction materials, etc.
Flexible containers (sauces), expandable bags and wrappings (bread bags), bags (garbage, grocery, freezer) etc.	Grocery bags, garbage bags, plastic lumber, etc.
Containers and lids (margarine, yogurt, dairy products), textiles, rope, twine, carpets, personal hygiene product (toothbrushes, combs), etc.	Car battery lid, car parts, milk boxes, measuring cups, etc.
Utensils, small milk and cream containers, coffee cups, plates, TV boxes, audio-video tapes, take-out food containers, CD cases, etc.	Office supplies, CD and video tape cases, etc.
Ketchup bottle, cheese packaging, etc.	Picnic tables, park benches, fences, etc.
Glass	As an aggregate for road sub bases, concrete blocks, asphalt and ceramic tiles
Steel	Making engine parts, steel structures and cans.

10.1.1 Technologies for Plastic Waste Management

Definition	Process	Advantages
Recycling		
Recovery of material from waste for a purpose that would otherwise require the consumption of virgin resources  	▸ Selection – recyclers/processors have to select the waste/scrap which is suitable for recycling/ reprocessing ▸ Segregation- the plastic waste shall be segregated as per the codes mentioned in the BIS guideline ▸ Processing – after selection and segregation, the waste shall be washed, shredded, agglomerated, extruded and granulated	▸ Recycling of plastic reduces the use of oil, which helps in extending the lifespan of our remaining fossil fuel reserves. On average one ton of recycled plastic saves 16.3 barrels of oil ▸ Recycling plastic uses up energy/ power as well, but it usually requires less energy than making fresh plastic. Recycling one ton of plastic waste saves 5,774 kilowatt hours of electric energy ▸ Plastics breakdown slowly in a landfill, however in the oceans, for example, they can breakdown faster, but they still take a long time to biodegrade: depending on the type of plastic it could take a century or more
Incineration		
The most effective way to reduce volume of solid waste is to burn it in a properly designed system. This process is called incineration  	In this process the waste burns directly in the presence of excess air (oxygen) at a temperature of about 800 degree Celsius and above, liberating heat energy, inert gases and ash. In an ideal incineration process, the hydrocarbon compounds of the combustible residue combine chemically with the molecular oxygen to generate carbon dioxide and water, and as residue generate oxides of metals and minerals	▸ Incineration is an efficient way to reduce the volume of volume and demand of landfills ▸ The heat energy generated can be used for heat or electricity

Landfilling		
Landfilling means disposing of waste under the soil cover	In landfills, the plastic degrades as it undergoes physical or chemical changes due to several environmental factors, such as sunlight, moisture, temperature, biological activity, etc.	The plastic disposed of in landfills cannot be recovered or used for energy production and therefore biodegrades faster, without any disturbances
	The biological degradation of plastic polymers is a process that induces chemical changes in polymer properties of plastic through biologically induced chemical and physical reactions	

Information regarding government-affiliated innovative technologies for solid waste management is available on following weblinks

1. https://indiawater.gov.in/misc/home.aspx

2. http://www.indiawater.gov.in/MISC/Homebp.aspx

10.2 Menstrual waste management (MWM)

Menstrual hygiene is an issue that every girl and woman has to deal with once every month as she attains puberty at around the age of 12 until she reaches menopause. Overall, a woman spends approximately 2,100 days menstruating which is equivalent to almost six years of her life. 355 million women and girls menstruate in India every month. 52 per cent of Indian women are not aware of periods before they start menstruating, and 23 per cent girls dropout of school after attaining puberty. Therefore, good MWM is crucial for the health, education and dignity of girls and women. Imparting adequate information and appropriate skills to girls and women on menstrual hygiene and MWM will enhance their self-esteem, and have a positive impact on their academic performance as well as on their quality of life.

a. What is menstrual waste

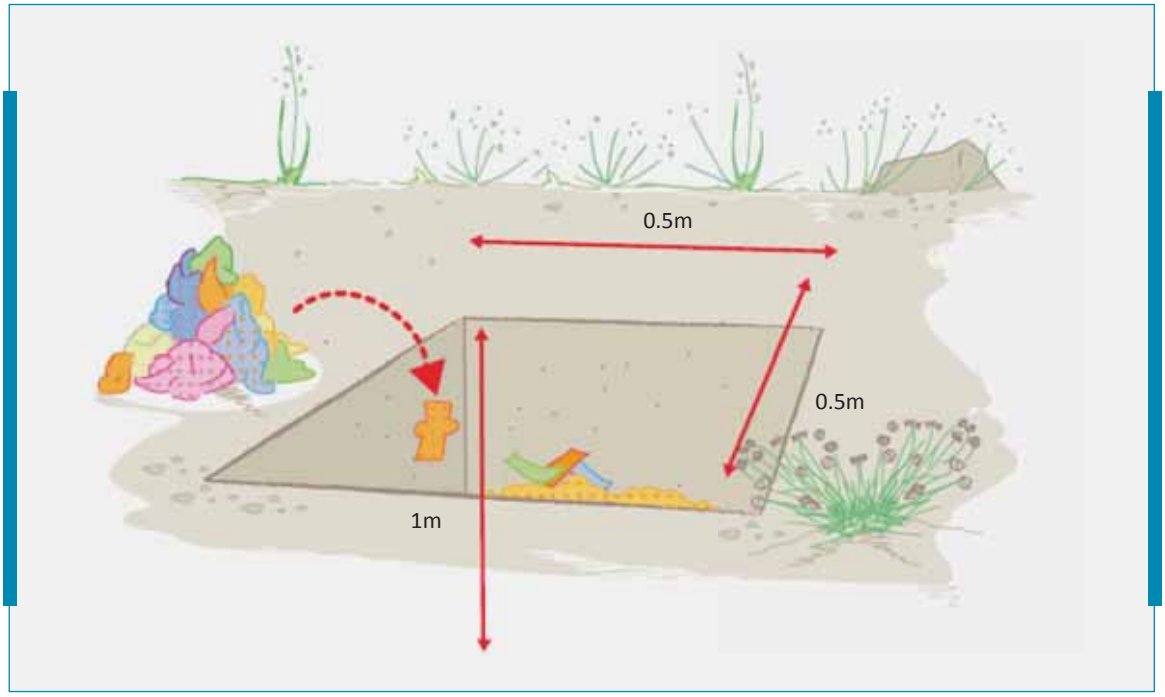
Menstrual waste comprises menstrual absorbents soiled with blood and human tissue remnants. Menstrual adsorbents include cloth, sanitary napkins and other materials used to absorb menstrual blood. Solid Waste Management Rules (2016) classifies menstrual waste as sanitary waste (under solid waste).

b. What is menstrual waste management

Scientific and safe disposal of used menstrual absorbents with privacy and dignity to prevent harmful effect on the environment,Provision of proper infrastructure with adequate water, cleaning agents and systems for MWM.

Ensure that the process of disposal and destruction of used menstrual materials is done with minimal human contact and with minimal environmental pollution.

It is essential to provide safe menstrual hygiene disposal options and ensure that girls and women know-how to use them. General practice evolves from being unsafe to safe, as unsafe disposal is unacceptable.



c. Disposal options for menstrual absorbents

Menstrual waste should be discarded at a distance of minimum seven metres from water bodies as blood stained materials can contaminate the environment and spread diseases, if not disposed of properly. Thus, it is critical to emphasize the need for proper disposal of menstrual waste. For this, safe disposal options for menstrual absorbents need to be considered and it is important to ensure that girls and women know-how to avail of them. Some of the best available methods of disposal are:

i. Deep burial (at least a metre deep)

ii. Composting (use of this method with leaves, other wet biomass and dung slurry)

iii. Incineration (waste pit, customized drum). Must have shafts that are high enough to ensure that emissions are not released on the premises.

iv. Collection of used cloths and napkins (often available in schools and public buildings)

v. Biosanitizers (depending on availability)

The various disposal methods for different menstrual absorbents that can be used for MWM are shown in the table below:

Material	Disposal into pit latrine	Deep burial	Composting	Pit burning	Incinerator
Used tissues, paper, cloth, cotton	√	√	√	Less recommended	√
Cotton napkins (reusable or commercial)	Less recommended	√	√	√	Less recommended
Commercial napkins with plastic and liners	Not recommended	√	Not possible	Not recommended	Recommended only with a good incinerator

Reference: Menstrual Hygiene Management, National Guideline December 2015

a. Provisions for MWM facilities

It is important to ensure adequate MWM facilities for safe menstrual hygiene at the institutional level. Moreover, beyond the MWM provision, WASH infrastructure should be operated and maintained properly. Some of the key provisions are listed below-

Special sanitation and hygiene requirements at school	Facilities in workplaces and public places
▸ Separate toilet and sanitation blocks in safe location to ensure privacy/adequate based on a ratio of one toilet for every 40 girls (and/or one urinal for every 20 girls) ▸ Adequate space in the cubicle for girls to change their napkins/cloth and to wash themselves ▸ Toilet cubicles with shelves, hooks or niches to keep clothing and menstrual adsorbents dry ▸ A well-positioned mirror so that girls can check for stains on their clothes.	▸ Separate clean washrooms, water and soap ▸ Vending machine / sanitary products ▸ Hangers, shelves, hooks ▸ Dryers, paper towels ▸ Facilities for safe disposal ▸ Medication and restroom

Special sanitation and hygiene requirements at school	Facilities in workplaces and public places
▸ A private bathing or changing unit, including a place for drying reusable menstrual absorbent ▸ Incinerator near/in girl's toilet for safe disposal of pads.	

10.3 Managing and disposing of plastic waste at the district/block level

Step 1 Clustering of villages

- Cluster villages with populations of minimum one lakh or are producing one ton of waste each per day
- Identify an appropriate site in the cluster to develop Material Recovery Facility (MRF) and a sanitary landfill for reuse (non-recyclable and inert)

Step 2 Conveyance and processing plan

- Develop a conveyance plan to collect waste from the storage point in each village periodically
- Parameters such as road access, distance, type of vehicle, quantity of waste will determine the course and nature of conveyance plan
- Build an MRF of appropriate size and with all required equipment at the block/ district level.
- Implement a standard operating procedure for the MRF to ensure that recyclables are of good quality
- Empanel vendors and sell recyclable wastes periodically.
- Send off inert and non-recyclable wastes for appropriate disposal to cement factories or other such thermal units, district biomedical waste incinerators or sanitary landfills

Step 3 Determine suitable business model

Identify revenue sources

- Sale of recyclable products
- District funds

Identify operation costs

- Collection costs, O&M costs of MRF and sanitary landfill
- Other management costs

Decide on a business model

- Will the district operate the MRF by itself or will it be operated by an external authority?

10.4 Roles of the sarpanch, swachhagrahi, ASHA AWW, VWSC and village-level stakeholders in solid waste management

Facilitate	▸ Organize a planning process at the village level ▸ Assessment of SWM facilities ▸ Identify issues and decide on solutions for effective solid waste management at the household and community levels ▸ Set up a system for O&M of solid waste management
Community mobilization	▸ Organize campaigns and competitions to maintain cleanliness in the village ▸ Awareness generation during Swachhata Diwas and in the Gram Sabha
Coordinate	▸ Coordinate with concerned departments for preparation of estimates and fund mobilization. ▸ Technical support from the block/ district during implementation
Convergence	▸ Place solid waste management facilities in the priority list of GPDP ▸ Converge with various financial resources like MGNREGA, PESA, IWMP, GOBAR-DHAN, NRHM, School Education, District Mineral funds to mobilize funds for creation of solid waste management and its operation and maintenance

References for further readings

- ODF Booklet, Department of Drinking Water and Sanitation
- Guidelines on SLWM issued by the MDWS on 7 July 2014
- Facilitator's Guide on solid waste management in rural areas developed by the NIRD
- Solid Waste Management: SOP for Swachh Campus developed by the NIRD
- Solid Liquid Waste Management: Note by the Government of India
- Technological options for SLRM in rural areas developed by the Government of India
- Source book on SLWM in rural areas developed by the Government of India
- Case studies of Banwadi and Nagthane of Satara districts developed by UNICEF, Maharashtra.
- Establishment and Management of Community Sanitary Complexes in Rural Areas A handbook by MDWS National guidelines on MHM, December 2015 issued by the Government of India
- Training manual on WASH and Health for MHM developed by the WSSCC
- Menstrual Hygiene Matters: Training guide for practitioners developed by WaterAid

CHAPTER 11

LIQUID WASTE MANAGEMENT

Key learning points

- Types of waste water
- Importance of greywater
- Technologies for greywater management

We have looked at the importance and components of and challenges posed by solid and liquid waste in the previous chapter. This chapter details types of wastewater, their importance and technologies for greywater management.

11.1 Types of wastewater

Waste water has two categories: domestic and industrial waste water. Industrial wastewater is generated during manufacturing processes, has a variable character and is very difficult to treat. Domestic waste water is generated at home, commercial complexes, hotels and educational institutions. Domestic waste water is further divided into two types:

A. Greywater- The total volume of wastewater produced as a result of washing clothes, vegetables, meat, fruits and dishware, bathing (this excludes water from toilets). This is also called sullage.

B. Blackwater – It is a mixture of urine, faeces, flush water along with anal cleansing water, and/ or dry cleansing materials. This is also called sewage.

11.2 Greywater management

About 90 per cent of wastewater generated in Indian villages is greywater, hence its management is important for public health and overall cleanliness of the villages. As explained earlier, effective management involves effective collection, transportation, treatment, reuse/ recycle and can be adopted either at the household level or village level. As far as possible, greywater management should be done at the household level so that zero or minimum greywater is generated at the village level.

While household level wastewater can be captured within the premises, community level wastewater needs to be transported to a common point for treatment and for reuse/ recycling purposes. The transportation can be done either through open drains or underground piped networks (depending on the technical and economic situation). All planning should be done by the community for greater ownership and ease of O&M.

Following are technologies which can be used for greywater management at the household and community levels.

Household level	Community level	
▸ Soak pits ▸ Leach pits ▸ Magic pits ▸ Kitchen garden	▸ Community soak pit ▸ Community leach pit ▸ Community kitchen garden ▸ Waste stabilization ponds	▸ Phytorid Technology ▸ Anaerobic Baffled Reactor (ABR) ▸ Duckweed pond system ▸ Constructed wetland ▸ Soil Biotechnology (SBT)

Some of the technologies are explained in table 11.2.1.

11.2.1 Impact of greywater management

Greywater is hazardous by nature and a breeding ground for diseases. Greywater, when mixed with faecal matter and other toilet waste, becomes blackwater and poses an even greater threat. Current greywater managing practices in rural areas need improvement. There is indiscriminate disposal of liquid waste in open areas. Vector-borne diseases like malaria, polio, dengue and cholera are largely caused due to stagnant greywater. At the turn of this decade, about one lakh people died annually from these diseases.

Quantity of greywater generated in rural India

Rural area in India is supplied with an average 50 litres of water per capita per day. 65 to 70 per cent of the total water supplied to rural India is converted into greywater. On the basis of the quantity of water supplied, rural India, on average, generates about 31,000 million litres of greywater daily. This primarily includes wastewater from the kitchen, bathroom and laundry. The volume and nature of greywater varies with the lifestyle of the population. One extremely important determinant of the volume and nature of wastewater is economic status and access to water sources. In less-affluent communities with poor access to water, quantities typically range from 20 to 30 litres/person daily. The volume increases to approximately 100 litres/person in developing areas. In fully urbanized regions, it is in the range of 100 to 200 litres/day. The census 2011 revealed that only 37 per cent of rural households had drainage inside their premises. There are 2, 55, 576 GPs in the country. A profile of liquid waste generated in these panchayats indicates that 19 per cent of the large GPs contributes to nearly 50 per cent of the waste.

Source: *Greywater Management in Rural India Greywater Management in Rural India, Department of Drinking Water and Sanitation, Ministry of Jal Shakti*

Use of greywater

Treated greywater provides an opportunity for decreasing the water stress in the country since it can be reused for non-potable purposes and for groundwater recharge. This is particularly important given India's growing need for water. Moreover, materials found in greywater become pollutants when they join larger water bodies or are allowed to stagnate, but if integrated into the soil system, they can act as a source of nutrition. In some developed countries, households and communities are effectively able to integrate their greywater into irrigation systems in kitchen gardens as well as in public parks, provided their processes meet the standards set out by agencies. The most common example is a holding tank connected to standard drainage pipes that deliver wastewater (meeting the standards notified by competent authorities) to the roots of trees and other large plants. While these solutions may be difficult to implement in India, they may be extremely useful in water-scarce rural areas. Effective policy design and technical intervention can turn greywater into a resource. Thus, greywater, if managed safely and scientifically, has the potential to be used for the purpose mentioned in the box.

Kitchen gardens

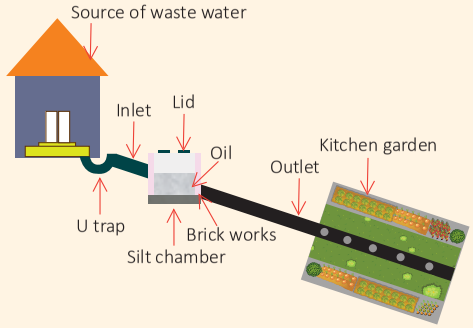
Recharging groundwater

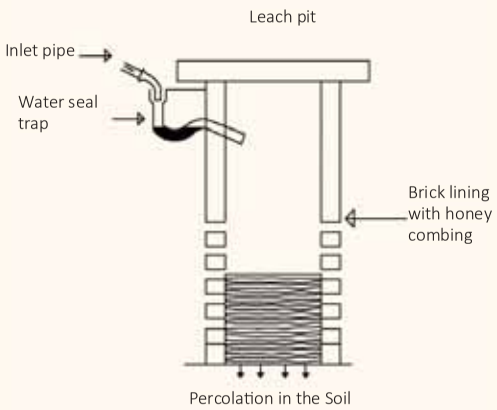
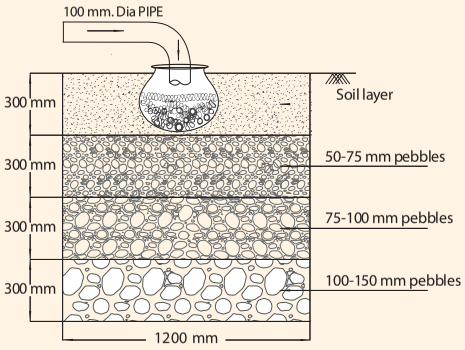
Non-potable domestic use like flushing and cleaning

Under certain specific contexts, irrigation in agricultural fields

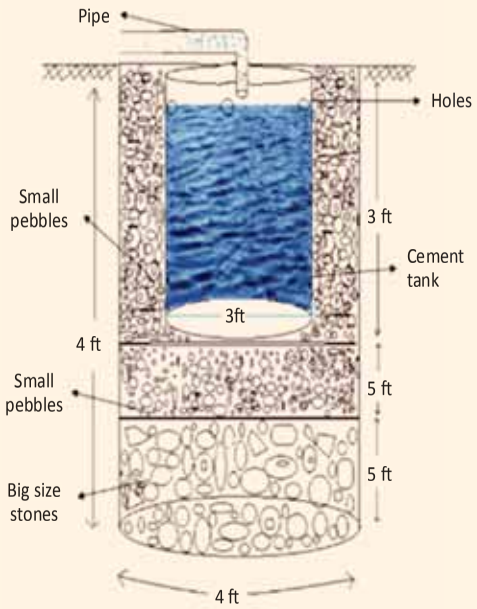
Source: Greywater Management in Rural India, Department of Drinking Water and Sanitation, Ministry of Jal Shakti

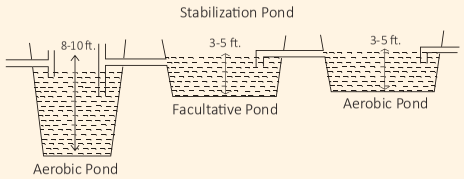
11.2.1 Technological options for greywater management

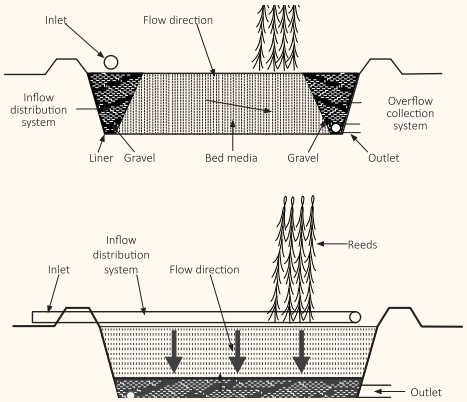
Technology	Description	Design consideration	Advantages	Limitations
Household level				
Kitchen garden with/without piped root zone system  	▸ With this methodology, treated greywater can be utilized to grow vegetables, flowers or fruits in the court-yard of the house. ▸ Applicable to houses with adequate courtyards. ▸ House owners should install the system with the help of trained masons.	The design of a kitchen garden will differ in every house depending upon available space, quantity of greywater and plant species intended to be grown. The wastewater must pass through a nhani trap or a P trap to remove impurities and should be covered with a suitable screen to screen out solids from the wastewater. Additional provision of a silt chamber is also recommended to remove organic and inert matter.	▸ Simple, cost-effective and environmental-friendly technology ▸ The nutrients contained in the wastewater also provide nourishment to growing plants ▸ Prevents water stagnation and vector breeding ▸ O&M costs are negligible	Use of strong detergents may be harmful to the plants in the kitchen garden

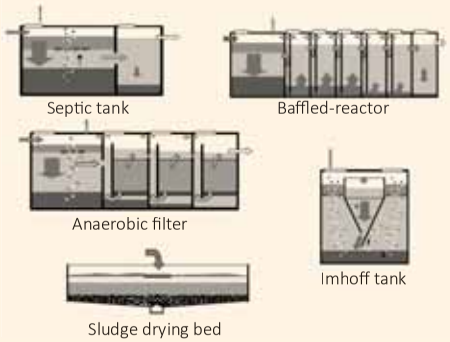
Technology	Description	Design consideration	Advantages	Limitations
Leach pit  	▸ Leach pit is a brick lined pit constructed in honeycomb masonry having a volume of about 0.78 cubic metres. ▸ Applicable to houses without adequate space for kitchen garden and where wastewater discharge is relatively more.	Dig a pit of dimensions 1.5 m diameter and 1.25 m depth. Honeycombing should be done through 6 to 8 holes of 40 mm each. Brick masonry is to be done with one part cement and six parts mortar. Connect the pipe at a height of one m from the bottom. Only 100 mm of the pipe should be inside the pit. Attach a nhani or P trap to avoid entry of mosquitoes and for the exit of foul odour. A silt chamber can be added to avoid any solids entering into the pit. The pit is suitably covered with flag stones or (RCC) cover of required dimensions.	▸ The entire wastewater from a household is absorbed by a pit leading to dry premises. This prevents stagnation of greywater and vector breeding ▸ No drains required ▸ O&M costs are negligible	Improper site selection (pit should be located 3 feet (ft.) away from the house wall and 10 ft. away from any groundwater source), as it may lead to dampness of walls and contamination of the groundwater source
Soak pit  	Technology of soak pit is used to manage sullage by allowing percolation of water into the soil.	A rectangular pit of one metre length, one metre width and one metre height is excavated. This pit is filled with three layers of aggregates and stones as described below: First layer (bottom layer) – 30 cm height, stones and aggregates of 100 – 150 mm size	▸ Water percolates into the soil preventing the sullage from stagnating ▸ Prevention of breeding of mosquitoes and spread of other waterborne diseases	▸ Soak pit is suitable for management of small quantities of wastewater.

Technology	Description	Design consideration	Advantages	Limitations
Soak pit 		Second layer (middle layer)- 30 cm height, stones and aggregates of 75-100 mm size Third layer (top layer)- 25 cm height, stones and aggregates of 50- 75 mm size While filling the aggregates in the third and topmost layer of 25 cm, a perforated earthen pot of 6-8" diameter is kept in the centre of the pit. Gunny bags, sand and soil are used to fill in the next 15 metres of the pit This layer is filled in such a manner that the opening of the earthen pot will remain exposed on the top of the ground. This earthen pot is filled with dry grass and other filtration materials.	▸ In the long-term it can help to recharge the groundwater to some extent	▸ Efficiency of a soak pit depends on the soil type. e.g., Black cotton soil absorbs less water and therefore a soak pit will work will hardly be efficient in this soil type ▸ Since water percolates into the soil, treated water not available for reuse

Technology	Description	Design consideration	Advantages	Limitations
Magic soak pit of Nanded pattern  	This intervention focuses upon breaking down the life cycle of mosquitoes at the egg-laying and larval stage. The objective of this path-breaking initiative is to deploy measures to prevent stagnation of water (especially in open gutters). Instead of following the traditional process in which a proper slope to the gutter prevents the water from stagnating, the water flowing into gutters is stopped and treated with the help of this unique magic pits of Nanded pattern.	The construction of soak pit initially required every family to dig a pit around 4ft x 4ft x 4ft and lay down stone boulders at the bottom. In this particular initiative, a cement tank was used to collect water instead of a traditional 'Matka'. In this process, used domestic water coming out through pipes is initially collected in the cement tank of about 1 to 1 ½ ft. diameter and about 2 to 3 ft. high. The stone boulders are again laid down in the surroundings of the pit. The cement tank is covered with the lid followed by a polythene sheet that is spread over the magic pit. The whole set up is then covered is soil and remains concealed.	Low cost and easy to construct Dry environment since the entire wastewater from a household is absorbed by this underground structure. This results in dry premises Freedom from mosquitoes Odour-free environment; No drains required Recharge of groundwater O&M costs are low and borne by the house owner.	One of the demerits of the Nanded pattern is the possibility of groundwater contamination especially in the areas with high groundwater table. Pit technologies fail in the areas with hard rocks due to low or zero leaching effects of water on the soil/ ground Operational Life of pit technology drastically decreases without a Nhani trap or screening medium to separate out heavy solids.

Technology	Description	Design consideration	Advantages	Limitations
Community level				
Stabilization pond  	Stabilization ponds are used to remove silt and solids in the wastewater (sullage/ greywater) by stabilizing the sullage. This stabilized sullage can be further used for reuse and recycle.	Three ponds are constructed. The first pond in this series is an anaerobic pond and has a depth of eight to 10 feet. Wastewater from the gutters is initially collected in this pond and is kept here for 2-5 days The second pond is a facultative pond with depth ranging from three to five feet. Wastewater from the first pond is carried to the second pond and is kept there for 10-15 days Third pond is an aerobic pond and has a height of around three to five feet. Wastewater from the second pond is finally collected in this tank. In this tank the water comes in contact with fresh air oxygen and sunlight and becomes pathogen free	Water treated in the stabilization pond could be used for agriculture and irrigation by minimizing the fresh water demand for agriculture and irrigation	-Require large areas of land -In areas with deep black cotton soil strata, the stabilization pond needs to be constructed with Ferro cement. This increases the construction cost of the stabilization pond

Technology	Description	Design consideration	Advantages	Limitations
Root zone bed technology (RZBT) 	Utilizing root zone treatment system, that is, planted filter beds consisting of sand/ gravel/soil to effectively treat domestic and industrial effluents in a natural way This can be established and maintained by the GP/ SHG with the support of a technical person	Root zone bed wastewater treatment systems are biological treatments that work through combined actions of bacteria and plants. They require an advanced treatment provided by a septic tank. The wastewater that comes out is pumped into the root bed by means of a system of pressurized tubes—here the water undergoes a treatment process that is mainly carried out by aerobic microorganisms	-RZBT have less installation requirements -Systems are able to tolerate fluctuations in flow -No mosquitoes and odour nuisance -Negligible maintenance cost as less energy and manpower required for O&M -As compared to a stabilization pond, RZBT can be installed in a relatively smaller space	-Application of this technology needs appropriate technical support from the GP - As the wastewater is consumed by plants, less water is available for recycling - The filter beds need to be cleaned up and labourers have to be available at the village level

Technology	Description	Design consideration	Advantages	Limitations
Decentralized wastewater treatment system (DEWATS) **DEWATS modules**  	DEWATS is a locally organized and people-driven system that typically consists of a settler, anaerobic baffled septic tank and a filter bed of gravel, sand, plantation-beds and a pond. The open pond or the polishing tank stores the remedied water and keeps it available for reuse. The construction of the plant requires just five to six skilled and unskilled labours since the plant requires RCC works. It has to be supervised by an engineer.	DEWATS is a technology package. In general, DEWATS comprises a settler, anaerobic baffled tanks, filter beds of gravel and sand, and an open pond. The open pond or the polishing tank recreates a living environment for the wastewater to clean itself naturally.	-Cost-efficient as only locally available materials are required -Minimal O&M required. -Treated water can be used for irrigation, gardening etc. -Energy recovery can generate biogas which can be used as fuel for cooking, lighting -Sludge rich in nutrients which can be further used as a natural fertilizer and soil conditioner -No groundwater pollution through long, leaking underground sewer systems	More land as well as proper maintenance is required

Case study: Ground water recharge through greywater management

With unity and determination of the villagers, Wadala, a village in North Solapur with 1030 households, has successfully achieved and maintained the ODF status. Now, channelizing the same collective energy, Wadala has transformed itself into a drainage-free village by effectively managing greywater with the help of soak pits. With 938 well-functioning soak pits all across the village, there is no trace of stagnant water around houses or on the streets or in the drains. The water that percolates through the soak pits has also increased the ground water levels. Owing to these 'magic pits', villagers are experiencing a clean and hygienic surrounding, free from mosquitos.

Information regarding government-affiliated innovative technologies for liquid waste management is available on following weblinks

1. https://indiawater.gov.in/misc/home.aspx

2. http://www.indiawater.gov.in/MISC/Homebp.aspx

11.3 Managing greywater

STEP 1: Identify sources and the quantity of greywater generated in a village

- Categorize waste generation points according to the number and nature of households, common public water points,water stagnating areas, and drainage discharge points and quantify the greywater generated

STEP 2: Understand local conditions

- Terrain, groundwater level, flood occurrences, soil permeability, septic tank overflow into drains, the reuse potential of treated water, funds and skills available for O&M

STEP 3: Greywater management plan

- Develop a plan with an appropriate mix of household and community soak pits with greywater management systems such as waste stabilization ponds, reed beds, DEWATS and others
- Design appropriate conveyance (drains, short pipes) system for each disposal or management system as per the above plan
- Design all systems with technical support from district engineers and start implementation

Case study: Managing wastewater in Karnal, Haryana

Chandsamand gram panchayat, district Karnal is an example of how a visionary leader with people participation made degraded areas resource-rich.

The Sarpanch, Smt. Babli Rani, has spread awareness and educated the community on the necessity of proper wastewater management and the importance of overall cleanliness. The village previously had overflowing ponds and water-logged streets due to improper wastewater disposal. Waste water stabilization ponds (three pond system) were created under the MGNGREGA by the GP to treat greywater and further use it for gardening, kitchen gardening and irrigation purposes.

Under the SBM, the SLWM project for the GPwith financial assistance is capped. The project was developed, designed and executed by the engineers of the Panchayati Raj Department and the Sarpanch took the initiative in the execution part. Apart from solving the problem of wastewater in villages, the project provided jobs to villagers under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).

CHAPTER 12

FAECAL SLUDGE MANAGEMENT (FSM)

Key learning points

- Nature of toilets according to their types, challenges and need of FSM
- Value chain of FSM
- Technologies for emptying toilets, transportation of toilet waste including faecal matters and the treatment of FSM
- Steps for FSM planning and management
- Role of GP/ sarpanch, swachhagrahi, ASHA and AWC in management of faecal sludge.

12.1 Background

Proper management of accumulated faecal sludge in rural areas is a challenge since no formal mechanism is in place for faecal sludge treatment and management. Inefficient treatment of faecal sludge can prove to be harmful to human health and the environment. Effective systems for the management of faecal sludge in various types of toilets are important for sustained use of toilets and for attaining the goal of complete sanitation in the state.

This chapter provides information on the challenges of and need for FSM and a service value chain, technologies of emptying, transportation and end treatment of faecal sludge and the planning process for faecal sludge management.

Other important definitions

FAECES

Refers to (semi-solid) excrements devoid of urine or water

SEPTAGE

Refers to the solid or settled contents of septic tanks.

SEWAGE

General term given to the mixture of water and excreta (urine and faeces).

SEWER

An open channel or closed pipe to convey sewage.

SEWERAGE

All the components of a system to collect transport and treat sewage (including pipes, pumps, tanks etc.)

SLUDGE

Refers to the settled solid matter in semi-solid condition – it is usually a mixture of solids and water deposited at the bottom of septic tanks.

12.2 Technology wise nature of FSM requirements

FSM is an important component of O&M of sanitation facilities. The following section discusses the FSM requirements of different types of toilets.

A. Twin pit latrines- In case of twin pit latrines, the liquid and gases generally infiltrate into the surrounding soil and solids are allowed to decompose through aerobic processes in the pit. The second pit is connected to the toilet when the first pit gets full. The first pit is then closed until the waste decomposes and turns into manure. This decomposition process takes at least a year. Apart from pit emptying, these types of toilets do not need external FSM.

B. Single pit latrines- When the single pit gets filled up, it cannot be used until the waste has completely decomposed. The users have no option but to revert to open defecation in such cases. Thus, these toilets need to be converted into twin pits by digging a second pit and connecting it to the toilet by a junction chamber.

C. Septic tank type toilets- In case of septic tank type toilets, anaerobic bacteria decompose the waste discharged into the tank. The rate of accumulation of sludge is faster than the rate of decomposition. Therefore, the accumulated faecal sludge must be periodically removed for further management. The systems for management of septage are available in big cities.

However, in case of rural areas or census towns, the septage is sometimes disposed of in open spaces or in water bodies. Considering the harmful impacts of such practices, appropriate systems for emptying, transporting and managing septage need to be developed.

D. Ecosan toilet- In this type of toilet, human waste is converted into nutritious "humanure" by addition of some material at appropriate temperature through an aerobic process.

E. Biogas toilet - In this type of toilet, human waste gets converted to biogas mainly comprising methane and carbon dioxide by an anaerobic process. It has the advantages of occupying comparatively much less space and requiring almost no water.

12.3 FSM in rural areas and census towns

According to Census 2011, out of a total of 121.0 crore people of India, 83.3 crore lives in rural areas and constitutes 68.84 per cent of the total population. On the other hand, rural areas are characterized by rapid increase of census towns (CTs) in the recent years. Between 2001 and 2011, CTs in the country have grown from 1362 to 3894. This situation clearly highlights the need for FSM in these areas. So far, about 15.49 crore toilets have been constructed in rural India which include twin pit types, single pit types, biogas and septic tank types. In CTs and rural India, single pits account for 22 per cent and septic tanks for 21 per cent of the households. The 5.9 crore toilets that have been constructed till 2018 will require emptying in coming years and FSM will become crucial in ensuring long-term sustainability. Therefore, FSM interventions, including setting up of new systems as well as expansion, strengthening and upgrading of existing systems is necessary in rural areas of the state.

12.4 Challenges of FSM

Following are the key challenges for effective FSM in India:

1. Large presence of on-site sanitation/storage systems
2. Absence of treatment plants
3. Irregular emptying (desludging) of septic tanks
4. Absence of a management system, of human resources and equipment
5. Effluents from on-site storage systems, which are not treated scientifically and are released into the open, pollute the environment
6. Untreated faecal sludge when used in agriculture, is unhygienic and has adverse impacts on human health

12.5 Need and importance of FSM

Inefficient treatment of faecal sludge can pose risks to human health and the environment. Proper management of accumulated faecal sludge in rural areas is a challenge as there is no formal mechanism in place for the sludge's treatment and management. Thus, proper FSM can be fulfilled in the following ways:

1. In case of twin pit latrines, though the waste is decomposed on-site, shifting to the second pit and emptying the used pit needs to be done on time.
2. Single pit latrines need to be converted into two pit latrines or some alternative technology needs to be thought of.
3. Considering the large number of septic tank type toilets which in many cases are technically flawed, systems for cleaning and desludging of septic tanks are necessary. Effective system for desludging of septic tanks is important for sustained use of toilets and attaining the goal of complete sanitation in any state.

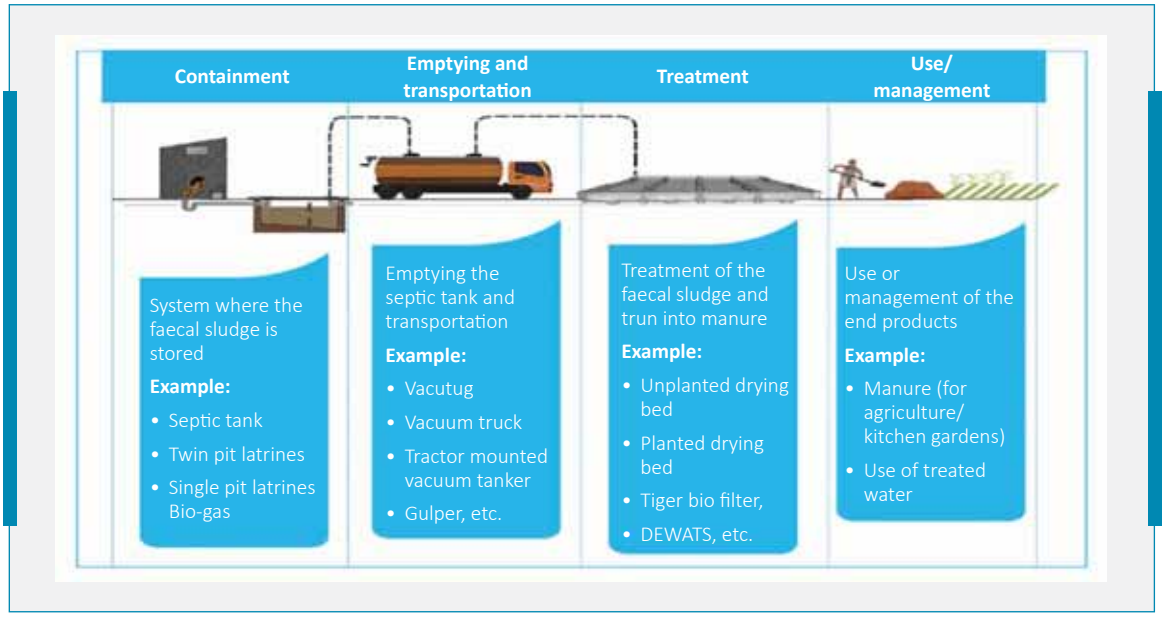
12.6 Various legal provisions

It has been noticed that though adequate provisions (such as Environmental Laws, Social Justice Laws, and a state's respective Panchayat Laws) exist for penalizing insanitary activities in, they are not implemented stringently or not implemented at all.

A. Details of Section/Department and subjects covered

Section/Department	Subjects covered
Environment, Central Pollution Board	▸ Water (Prevention and Control of Pollution) Act, 1974 and the Environment (Protection) Act, 1986 ▪ Standards for sewage, septage and treated effluents to be discharged into water bodies, marine and coastal areas and on land ▪ Discharge of untreated septage or wastewater is prohibited
Social Justice	▸ The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993 and The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013: ▪ Insanitary latrines (owners are responsible for ensuring that toilets do not require direct discharge or manual handling) ▪ Manual scavenging and hazardous cleaning (households and the contracting agency will be accountable if violations occur)
State specific penalizing Acts {e.g., Bombay Police Act (provision 115)}	(a)littering streets, public places or public resorts by (b) committing a nuisance by easing oneself c) spit or throw dust, ashes, refuse or rubbish to cause annoyance to a passer-by
Panchayat Laws	i. Draft of Model Panchayat and Gram Swaraj Act, Ministry of Panchayati Raj ii. 73rd Constitutional Amendment iii. State Panchayat Laws

Emptying the pits of twin-pit pour-flush toilets is not classified as manual scavenging in India, as the excreta is already partly treated and degraded in those pits.



12.7 FSM value chain

For efficient FSM, one needs to understand the entire FSM value chain. The service value chain includes safe containment of sludge, safe emptying and transportation, treatment and disposal/ reuse of faecal sludge (refer to diagram 12.1). Each of these value chain components needs to be addressed properly to prevent health and environmental hazards in rural areas. An overview of treatment technologies, along with their treatment objectives and functionality are included in details in this section.

a) Safe containment of sludge

Promoting an appropriate and area-specific containment technology is vital and the Central public Health and Environmental Engineering Organization (CPHEEO)'s norms should be followed for implementing safe containment technologies.

Principally, there are three important technologies for safe containment of the faecal sludge in rural areas:

- Twin pit pour flush toilet
- Septic Tank Toilet
- Biogas

In case of single or two pit latrines, the pit should not be located near a water source or be built on areas having higher groundwater tables. Technically accuracy is crucial for all types of toilets.

Inappropriate construction of septic tanks can lead to leakages in the tank, limited or no access to tanks, chocking up of the toilet, or inappropriate treatment of waste, etc.

b) Safe emptying and transportation

A septic tank is a combined sedimentation and digestion tank where solids settle down to the bottom, accompanied by anaerobic digestion of settled solids (sludge) and liquid, resulting in reasonable reduction in the volume of sludge and biodegradable matter and release of gases. A substantial portion of solids escape with the effluent whenever a septic tank has not been desludged in a long time (a period that exceeds the intended period). Therefore, septic tanks need to be desludged by automatic or human operated technologies. It is very important to avoid any direct human contact with faecal sludge, and the safety measures should be followed thoroughly. Technologies used for emptying and transportation are vacutug, vacuum truck, tractor mounted vacuum tanker, Gulper, MAPET, etc.

Each of these Value Chain components needs to be addressed properly to prevent health and environmental impacts in rural areas due to indiscriminate disposal of hazardous faecal waste.

Considering the FSM Service Value Chain and its components, the selection of appropriate technology option for rural areas and its effective management is important. Various technology options for collection, transportation and treatment are described in detail in the following sections.

c) Treatment

Efficient treatment of faecal sludge is critical considering the characteristics of faecal sludge. Many technologies of faecal sludge treatment like sewage treatment plants (STP) are being used in urban areas. However, these technologies cannot be used in rural areas due to financial constraints and inadequate O&M systems. A few low cost and simpler technologies, such as unplanted drying bed, deep row entrenchment, planted drying bed, tiger biofilter and DEWATS can be used in rural areas for treating faecal sludge.

d) Use/management

The end-products of the FSM can be reused and managed well. The treated water from treatment plants can be used for agriculture and the compost can be used as manure for agriculture/ kitchen gardens. In big cities, through effective garbage disposal, the compost can be mixed with biodegradable garbage to produce superior quality manure.

12.8 Technologies for safe collection and transportation of faecal sludge

The collection of faecal sludge from septic tank/soak pit and its safe transportation is the most important aspect of FSM practice, as all subsequent processes depend on safe transportation. Some of the available technologies for collection and transportation are described on the following pages.

Gulper		
Brief about the technology	▸ Gulper is a portable device ▸ It is a recent invention which is inexpensive and easy to operate. ▸ Reduces sludge contact as it consists of a PVC riser pipe containing two stainless non-return butterfly valves. ▸ Performs well with less viscous sludge and is capable of pumping at the rate of approximately 30 l/min. ▸ The gulper can be built using locally available material and manufacturing techniques. ▸ This technology is very suitable for densely populated and low-income areas	
Description and working principles	▸ The gulper is a piston pump on top of a pipe with an outlet pipe on the side. The upstroke of the piston draws sludge through a valve into the cylinder followed by discharge on the down stroke through a valve into the outlet. ▸ A bucket placed under the outlet pipe collects the waste during desludging. The bottom of the pipe is lowered into the pit or tank. The pump is operated by two to three workers who push and pull a lever on top of the gulper.	
Limitations	▸ Slow emptying time ▸ Limitation on the operation depth – cannot desludge from containment units which are deep ▸ Solid wastes choke the system and can lead to operational delays ▸ Health risk of sludge splashing onto the user during operation ▸ Cannot remove dried or thick sludge	

MAPET		
Brief about the technology	▸ The MAPET is a human-powered vacuum system for the collection and short-distance transport of sludge. ▸ It combines the advantages of a vacuum pump with the mobility of small desludging system. ▸ It is suitable for densely populated areas, especially those housing low-income groups, as the sludge in the containment unit is thick and often inaccessible due to narrow roads.	

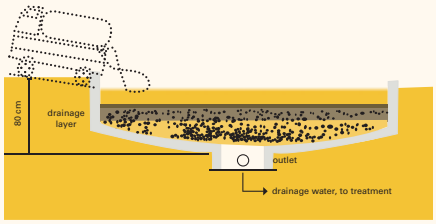
MAPET	
Description and working principles	▸ MAPET uses a manually-powered piston pump to create a vacuum and empty contents from the pit onto a collection tank. ▸ The tank has a capacity of 200l and is mounted on a push cart. ▸ Containment units with viscous sludge need to be diluted with water in order to ease the collection process. ▸ Once filled, the tanks can be pushed manually to a disposal point or transfer station.
Limitations	▸ Consists of parts which may not be available locally. ▸ Limited tank capacity of 200l could mean that big pits may need multiple desludging cycles. ▸ Limitation on the depth of collection of sludge from containment systems.

Vacuum tanker		
Brief about the technology	Vacuum tankers comprise a truck or any other vehicle combined with tank and a vacuum pump. They use desludging technology since they have a high tank volume, faster rate of emptying and high mobility.	
Description and working principles	Vacuum tankers can empty pits or septic tanks at a much higher rate and carry large quantities of sludge much faster. They are generally fitted with storage tanks of 2000-15000 litres. These tanks are fitted with vane pumps. The pump generates a suction pressure inside the tank which enables desludging of septic tanks through a hose connected at the tank outlet. A suitable apparatus is provided to prevent sludge from entering the vacuum pump and damaging it. In this type of technology, diverse types of vane pumps can be installed based on the cost, capacity and liquid range within which the pump is most suitable to operate. The pump is efficient enough to suction out the settled thick sludge at the bottom of a septic tank very conveniently. This type of arrangement consists of three main components: constant air drag, air bleed and plug drag. In general, the following things should be noted while using this technology and its associated features: ▸ Total capacity of the storage tank and the level beyond which the sludge suction should be tripped off. ▸ Point of extraction and the connecting road (length and width) to determine the difficulty of accessing the desired point. ▸ Scope of total quantity for desludging ▸ Financial provision ▸ Availability of skilled labour etc.	

Vacuum tanker	
Limitations	▸ Cannot access all types of roads, especially smaller ones ▸ Difficulties associated with trash choking at the inlet ▸ Higher capital investment and operating expenditure ▸ Requires repairs which can cause long delays

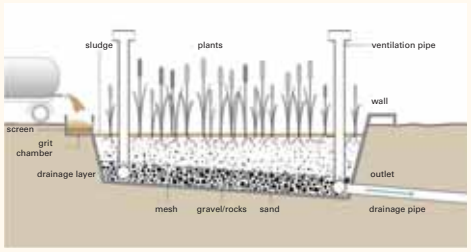
12.9 Technologies for treatment of faecal sludge in rural areas

Due to growing concerns about faecal sludge's adverse impact on the environment and human health, scientific treatment of faecal sludge is very crucial. Presently, there are various globally adopted technologies and processes for treatment of faecal sludge. Some of them are described below.

Unplanted drying bed		
Brief about the technology	▸ It is a simple, permeable bed composed of several drainage layers. ▸ When loaded with sludge, it collects leachate that has percolated and allows the sludge to dry by percolation and evaporation. ▸ Approximately 50–80 per cent of the sludge volume drains off as the liquid evaporates.	
	▸ This sludge needs to be further composted before it can be safely disposed of, or used as a nutrient-rich soil conditioner for irrigation. ▸ The percolate, however, still contains pathogens and needs to be further treated.	
Description and working principles	▸ The bottom of the drying bed is lined with perforated pipes to drain away the leachate that percolates through the bed. ▸ On top of the pipes layers of gravel and sand that support the sludge and allow the liquid to infiltrate and collect into the pipe. While the solid fraction remains on the filter surface and is dried by natural evaporation, the liquid percolates. ▸ Sludge is applied in layers on top of the gravel beds to dry naturally. The layers should not be too thick as this will delay the drying process. The final moisture content after 10 to 15 days of drying should be approximately 60 per cent. ▸ After the sludge is dried, separate it from the sand layer and transport for further treatment, end-use or final disposal. The leachate that is collected in drainage pipes must be treated further.	

Unplanted drying bed	
Limitations	▸ Faecal sludge is hazardous and anyone working with it should wear protective clothing, boots and gloves. ▸ In dry climates moisture stress, along with high salt conditions, resulting from the application of faecal sludge creates harsh conditions for plant growth. ▸ The beds should be installed at a certain distance from the settlements, due to odour issues. ▸ The percolates from sludge drying beds contain pathogens and need to be further treated.

Deep row entrenchment		
Brief about the technology	▸ Deep row entrenchment consists of digging deep trenches, filling them with sludge and covering them with soil. ▸ Trees are then planted on top, which benefit from the biodegradable matter and nutrients that are slowly released from the faecal sludge. ▸ In areas where there are adequate lands available, deep row entrenchment can be a simple and low cost option. It has limited O&M issues and produces no visual or olfactory nuisances.	
Description and working principles	▸ Deep row entrenchment is best implemented in arid to semi-arid regions. ▸ Raw sludge is spread out on farm fields during the dry season and then incorporated into fields when crops are planted during the rainy season. ▸ A pit method is also used in which faecal sludge is buried with other crop residues and left to mature for a few months prior to use. ▸ Entrenchment of sludge enables nutrients to be preserved and used by plants over time. ▸ It must be ensured that adequate barriers are in place and that there is sufficient land area available.	
Limitations	▸ Large areas of land required ▸ The need to ensure that the groundwater table does not get affected ▸ There is lack of legislation in countries regarding this option	

Planted drying bed		
Brief about the technology	▸ In this technology, a shallow pond consisting of several drainage layers is used to separate the liquid fraction of faecal sludge by way of percolation and evaporation. ▸ The planted bed is advantageous as the filters do not need to be desludged after every drying cycle. ▸ This enables the application of fresh sludge directly on top of the previously applied layer. ▸ Also, the plants and their roots help in maintaining the porosity of the filter. ▸ Planted drying beds require desludging only once in five to 10 years. ▸ The removed sludge being a nutrient-rich soil conditioner can be directly reused in agriculture.	
Description and working principles	▸ The bed frame is typically made from concrete or a plastic liner with the bottom surface slightly sloped in order to facilitate percolation and drainage. ▸ After that, three layers are constructed on the bed: 250 mm of coarse gravel, 250 mm of fine gravel, and 150 mm of sand layer. ▸ Depending upon the local climatic conditions, suitable non-invasive plant species like reeds, cattails, antelope grass and papyrus are planted on top of the bed. ▸ After preparing the bed as mentioned above, the sludge is applied every three to seven days in layers that are about 100 mm thick. Such layers are created by placing the sludge in a grit chamber constructed on one side of the bed.	
	▸ The solid fraction of the sludge is screened in the grit chamber whereas the liquid fraction flows down towards the planted bed through an outlet. ▸ The plants enhance evaporation by transpiration. This process is continued for about five to 10 years and yields a nutrient-rich soil conditioner.	
Limitations	▸ The treatment process poses health risk and thus it is necessary to for workers to use protective wears, gumboots and gloves. ▸ In dry climatic areas, low moisture content is not conducive to plant growth ▸ Due to odour issues, the bed should be located a bit far from human settlements. ▸ Percolates from sludge drying beds contain pathogens and need to be treated further.	

Information regarding government-affiliated innovative technologies for FSM is available on the following web links

1. https://indiawater.gov.in/misc/home.aspx

2. http://www.indiawater.gov.in/MISC/Homebp.aspx

12.10 Steps for effective FSM

STEP 1: Know your pits and tanks

- ✓ Estimate the number of single pits and septic tanks in the area
- ✓ Know the typical size of the pits and tanks in the area
- ✓ Septic tanks must be desludged every three to five years
- ✓ Pits can be desludged when full – it's better to desludge them every five to six years

STEP 2: Retrofit (on-site) containment systems

(a) All single pits

- ✓ Convert to twin pit toilets (by adding a pit through a junction box)
- ✓ Or vermi – filter toilet or toilet linked to a biogas plant

(b) Septic tanks without soak pit

- ✓ Add soak pit and then initiate FSM practices

STEP 3: Regulating desludging operators

- ✓ Identify all operators in the area
- ✓ Build capacities and certify them
- ✓ Licence their operations and introduce regulation

STEP 4: Plan faecal sludge treatment

OPTION 1: Dispose at the nearest STP/FSTP	OPTION 2: Plan a new rural FSTP
1. Within a radius of 10- 15 km	1. Identify suitable land
2. Obtain permission to dispose of at the plant	2. Determine a cluster of villages to be served by the new rural FSTP based on the distance of the FSTP from the villages and how accessible the village roads are
3. Ascertain spare capacity of the plant	3. Implement a trench for licensed operators to dispose of sludge temporarily
4. Identify a cluster of villages from which the sludge can be disposed at this plant	4. Plan for an FSTP of appropriate capacity
5. Get all licensed operators for those villages to dispose of sludge at the plant	5. Consult a technical agency /expert
6. If successful, go to Step 5	

STEP 5: Determine your business model

(i) Identify revenue sources

- ✓ Desludging fee
- ✓ Fee for disposing of sludge at the plant by a private truck operator
- ✓ Sale of treatment plant products such as manure, bioslurry, etc.
- ✓ User fee, taxes, grants
- ✓ Other sources – eg : hoardings with advertisements at the treatment plant

(ii) Determine operational costs

- ✓ Desludging costs
- ✓ O&M of treatment plants
- ✓ Costs of management

(iii) Decide business model

- ✓ Fee structures for APL/BPL families
- ✓ User pay per service versus monthly fee to the GP

STEP 6 : Implement FSM

Implement desludging

- Devise a plan for scheduled desludging
- Eg: Tender an entire village to a licensed operator for desludging every four years – recommended for disposal at the existing STP
- Eg: Desludge a cluster of households every week to cover the cluster- recommended for disposal at a dedicated FSTP
- Monitor license conditions, customer grievances and disposal of sludge

Implement treatment plant

- ✓ Identify capital
- ✓ Obtain permits
- ✓ Float a tender for plant construction
- ✓ Build the plant
- ✓ Outsource O&M to a local entrepreneur or CBO
- ✓ Monitor untreated sludge disposal at the plant

Case study: FSM in Devanahalli

Around 90 per cent of the households (~5800) are equipped with toilets that have a single pit, a septic tank, a twin pit, and an open drain each. The remaining 10 per cent of the households are without toilets and mostly defecate in the open or use shared toilets/public toilets. Hence, a comprehensive FSM system was conceived by the DMA under the Government of Karnataka. The plant at Devanahalli has the capacity to serve approximately 30,000 people with the plant spreading over an area of 650 square metres.

It's a simple and low cost O&M plant using the technology of gravity-based biological treatment. The plant was commissioned with a capital cost of INR 90 lakhs and has an operating cost of INR 24 lakhs per year. The lifecycle cost of the plant is INR 1500 per capita, which is very low in itself. The treatment module comprises six stages which include screening, sludge–liquid separation, sludge stabilization, dewatering, disinfection, and liquid treatment.

Reference: https://www.youtube.com/watch?v=osLAQcKHx9M

References for further readings

- Training manual on faecal sludge management developed by the Water and Sanitation Department, Government of Maharashtra
- Policy paper on Septage Management in India by the CEE
- Improving sanitation in Sinnar, Pune, Maharashtra detailed project report by Sinnar Municipal Corporation.
- Training Module on Septage Management Plan PAS Project, CEPT University, India
- Sandec Training Tool 1.0 – Module 5Faecal Sludge Management (FSM)
- National Policy on Faecal Sludge and Septage Management (FSSM) by MoUD
- Primer on Faecal Sludge and Septage Management
- Septage management a practitioner's guide
- Guidelines for Septage Management in Maharashtra
- ODF Booklet, Department of Drinking Water and Sanitation

SECTION 4

CROSS CUTTING INTERVENTIONS

- Resource Envelope for Water and Sanitation Facilities
- Information, Education and Communication for Sujal and Swachh Gaon
- Community-led Action Planning Process for Sujal and Swachh Gaon and Support from District

CHAPTER 13

RESOURCE ENVELOPE FOR WATER AND SANITATION FACILITIES

Key learning points

- Importance of convergence
- Various schemes available which can be leveraged for convergence
- Water and sanitation interventions under CSR
- Key actions for prioritizing water and sanitation
- WASH interventions in GPDP
- Swachh Credit

13.1 Background

Water and sanitation activities need funds that the Government has to mobilize through relevant schemes and alternative financing options. If easy / short term loans are made available to families which find it difficult to finance wash and sanitation facilities, the sector (water and sanitation) will get a boost. Secondly, finances for specific activities may also be mobilized through convergence of government schemes. This chapter describes the need for and process of mobilizing funds through convergence of various government schemes as well as alternative finance options.

13.2 Convergence

Coordinated planning and service delivery ensures timely inputs from multiple sources simultaneously, avoiding duplication. Specific convergence initiatives could be of a complementary or supplementary nature**.** Funds from various schemes can also be mobilized for construction, repairing and O&M of water and sanitation facilities. For mobilizing funds, it is important to understand these schemes and process to avail of them. A few schemes are described below:

13.2.1 Sector-wise schemes and expected convergence

S. No	Department	Scheme	About the programme/ schemes/Abhiyan	Use
1.	Rural Development https://nrlm.gov.in	National Rural Livelihood Mission(NRLM)	▸ Aim of the scheme is to reduce poverty by enabling economically disadvantaged households to secure gainful self-employment and skilled wage employment opportunities. This will significantly improve their livelihoods and sustain the improvement by building strong grassroot institutions for the economically disadvantaged. Under this scheme, the Government provides a loan of INR 3 lakh at an interest rate of seven per cent (which can be reduced to four per cent at the time of repayment). ▸ The scheme also helps in increasing the household income by improving access to financial services. ▸ NRLM also helps in harnessing capabilities and capacities of the economically disadvantaged so that they can participate in the growth of the economy	Convergence with this scheme will help: ▸ To provide loan to SHGs for toilet repairing and construction. ▸ To provide capital for starting small-scale businesses related to sanitation
2.	Rural Development http://nrega.nic.in	Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)	▸ As per the National Rural Employment Guarantee Act (NREGA) of 2005, 100 days of employment (in one financial year) is guaranteed to any rural household adult who is willing to do unskilled manual work.	Convergence with the MGNREGA will help to: ▸ Undertake construction works for solid and liquid waste management at household and community levels

S. No	Department	Scheme	About the programme/ schemes/Abhiyan	Use
			▸ The Act addresses working people and their Fundamental Right to live life with dignity and highlights the importance of the basic Right to Work. If a person does not get a job within 15 days, he is eligible for unemployment allowance. ▸ The MGREGS (scheme) is based on the provisions of the Act	▸ Construction works for source sustainability ▸ Construction and repair of school sanitation facilities ▸ Construction of toilets
3.	Rural Development https://missionantyodaya.nic.in/	Mission Antyodaya	▸ Mission Antyodaya is a convergence framework to effectively measure outcomes for parameters that transform lives and livelihoods. ▸ It seeks to converge government interventions with that of the GP (the basic unit of planning) to pool human and financial resources by following a saturation approach and ensure sustainable livelihoods	Convergence with this scheme will help ▸ Poor families to take up small-scale sanitation businesses
4.	Statistics and Programme implementation https://www.mplads.gov.in	Members of Parliament Local Area Development Scheme	▸ Each MP has the liberty to suggest the District Collector to take up works that may cost a maximum of INR 5 crores in his/her constituency. ▸ Rajya Sabha Members of the Parliament can recommend works in one or more districts in the state from which he/she has been elected	This will help to ▸ Mobilize funds for construction of community sanitary complexes at places with high floating populations and for activities which require more funds

S. No	Department	Scheme	About the programme/ schemes/Abhiyan	Use
5.	Education https://mhrd.gov.in/ssa	Sarva Shikasha Abhiyan	▸ Launched in 2001. It is one of India's flagship programmes for universalization of elementary education. ▸ Its overall goals include universal access and retention, bridging of gaps resulting from gender and social issues in elementary education and achieving significant enhancement in learning levels of children	This will help to mobilize funds for ▸ Construction and repairing of toilets ▸ Setting up water supply facilities ▸ Setting up hand wash stations
6.	Education samagra.mhrd.gov.in/	Samagra Shiksha	▸ Samagra Shiksha is an overarching programme for the school education sector extending from preschool to class 12. ▸ The scheme has been prepared with the broader goal of improving school effectiveness measured in terms of equal opportunities for schooling and equitable learning outcomes. ▸ It includes three Schemes: Sarva Shiksha Abhiyan (SSA), Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and Teacher Education (TE)	This scheme will help to mobilize funds for preparation of Swachhata Action Plan

S. No	Department	Scheme	About the programme/ schemes/Abhiyan	Use
7.	Finance https://fincomindia.nic.in/ShowContent.aspx?uid1=3&uid2=0&uid3=0&uid4=0	Fourteenth Finance Commission	▸ Five-Year Plans (FYPs) are centralized and integrated national economic programmes. ▸ According to the recommendation of the Fourteenth Finance Commission(FFC), the grant-in-aid is provided to the panchayat in two parts: basic grants (90 per cent) and performance grants (10 per cent) ▸ The FFC recommends basic grants to local bodies with the purpose of providing unconditional support to the GP for delivering basic services. ▸ Performance grants are made for technical and administrative activities. This fund can be utilized for O&M of water and sanitation facilities	The grants help to utilize funds ▸ To support and strengthen the delivery of basic services of water supply, sanitation including septage management, sewage and solid waste management ▸ To prepare a technical plan for solid and liquid waste management and water supply
8.	Health and Family Welfare https://www.nhp.gov.in/kayakalp-swacchta-guidelines-for-public-health-facilities_pg	Kayakalp Award Scheme'	▸ Launched in May 2015 as an extension of the 'Swachh Bharat Mission'. ▸ Aim of the initiative is to improve and promote cleanliness, hygiene, waste management and infection control practices in public health care facilities and provide incentives to the facilities performing the best ▸ The scheme is intended to encourage and incentivize Public Health Facilities (PHFs) in the country to demonstrate their commitment to cleanliness, hygiene and infection control practices	This scheme will help to ▸ Promote cleanliness and hygiene in public health centres. ▸ Motivate health centres to manage waste efficiently. ▸ Awards received for exemplary performance can be used for water and sanitation works

13.3 Water and sanitation interventions under CSR

Many Indian companies, like ITC Limited, ONGC, NTPC Ltd, Northern Coalfields Limited, Hindustan Unilever Ltd etc., have been contributing through CSR. Funds for hardware and software activities are mobilized from CSRs. The following steps are suggested to avail of funds from CSRs:

- Identification of companies which can provide CSR funds for water and sanitation
- Approaching these companies with the necessary data and documents
- Inviting interested companies to the village
- Sharing the status, need, and resources required with company representatives
- Preparing a proposal and submitting it to the interested company
- More information regarding CSRs with their contact details are available on the following websites:

1. *https://www.csrwire.com/directory*
2. *https://www.csr.gov.in/*
3. *https://csrbox.org/contact-CSR*

13.4 Key actions for prioritizing water and sanitation interventions in the Gram Panchayat Development Plan (GPDP)

The GPDP is one of the most important sources through which the GP can mobilize funds for various activities. The following actions should be taken by the GP to prioritize water and sanitation interventions in the GPDP

1. During the GPDP primary meeting-
   - Prioritize water and sanitation activities proposed in the action plan
   - Include resource allocation for the activities in the GPDP
   - Finalize specific water and sanitation activities for FYPs and annual plans
2. Presentation of recommendations and approval of proposed activities in the Gram Sabha
3. Documentation of recommendations
4. Finalization of the GPDP

Swachh Credit

Sustaining sanitation facilities is crucial to achieving the goal of Swachh Bharat. Changes in attitude to sanitation and financial support are also necessary for sustainable use of sanitation facilities.

For this, local investments may be needed for:

Sanitation

- Upgradation / retrofitting of Toilets,
- Renovation or construction of Toilets,
- SLWM infrastructure,
- Initiatives to improve the quality of local water

Water

- Piped water connections
- Water treatment units
- Creation and maintenance of rainwater harvesting structures, Groundwater recharge infrastructure
- Development of localized water treatment solutions

13.4.1 Key provisions under Swachh Credit

- The following may be done under Swachh Credit
  - Commercial banks to be contacted for easy credit in the form of "soft loans" to individuals and communities (preferably through SHGs or GPs) for specific water and sanitation initiatives.
  - Microfinancial institutions to provide low interest credit for water and sanitation loans, mainly through SHGs
  - Low interest loans for households with persons with disabilities

Case study: Leveraging Swachh Credit

"I am a member of Jeevdayini SHG in Savroli and a recipient of a loan from the Roshani VO. I am happy that the MAVIM, the MSRLM and water.org helped us in getting this loan well on time. We have used it for repairing, plastering, colouring, and flooring of the toilet. The toilet is usable again. Regular toilet usage has improved my family's health and well- being."

- Ms. Anita Pawar, SHG member and a resident of Savroli, Shahapur block, Thane

CHAPTER 14

INFORMATION, EDUCATION AND COMMUNICATION FOR SUJAL AND SWACHH GAON

Key discussion points

- Importance of IEC in creating and sustaining Sujal and Swachh Gaon
- Key thematic areas, communication approaches and messages for a Sujal and Swachh Gaon
- Planning, implementation and monitoring of IEC activities at the GP level
- Roles and responsibilities of PRIs/the Sarpanch in IEC interventions

14.1 Background

Strategic use of communication is critical for achieving the goals of a Sujal and Swachh Gaon. IEC is a process of working with individuals, communities and societies to promote positive behaviours appropriate to their respective contexts and provide a supportive environment which enables them to initiate and sustain these behaviours. To influence key behaviours and ensure active participation of families and communities to transform villages into Sujal and Swachh Gaon, it is important to understand the barriers (highlighted in earlier chapters) that stop people from adopting new behaviours, the incentive that would motivate people to start/adopt new behaviours and the ways that will motivate people to maintain their new behaviours with regard to water and sanitation.

IEC helps individuals and communities to understand the benefits of hygiene practices and equips them to manage, maintain and sustain the drinking water sources and environmental cleanliness. It employs a systematic process beginning with the understanding of a situation (in this case water and sanitation), analysis of personal, societal and environmental factors, followed by communication planning, implementation, monitoring and evaluation.

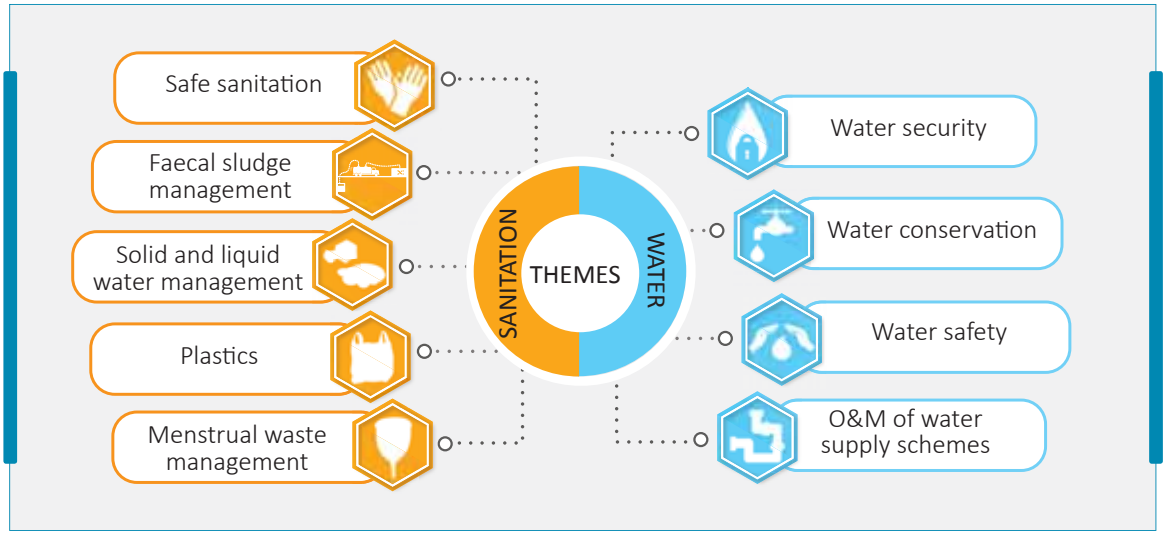
For any communication to be effective it is important to identify the key audiences/ stakeholder groups so that the communication can be tailored to their needs. This helps in influencing

and motivating them to practise and sustain desired behaviours. Different communication approaches, messages and content are needed for each of the groups. Diverse communication approaches like advocacy, interpersonal communication, social and community mobilization help engage individuals and their communities at different levels and engenders new WASH behaviours.

PRIs can trigger and mobilize communities, have regular interactions and meetings with families and communities addressing barriers related to the adoption of positive practices. They can create a team of gram panchayat members/ ward members; swachhagrahis/jal doots; nigrani samitis; village-level front-line workers: AWW, ASHA, Gram Sevak, volunteers; SHGs/ CBOs/ institutions; youth; children; teachers etc. to act as community messengers, initiate dialogue on the issues and influence the decision-making process at the village level. Social networks and community institutions such as nigrani samitis and swachhagrahis that have been created in the process of attaining the ODF status can effectively motivate households to adopt desired sanitation behaviours, monitor sustained toilet use to ensure there are no slippages, and follow-up with families practising OD to reinforce water, sanitation and hygiene messages. At the same time, information about safe sanitation practices, such as toilet retrofitting, regular and periodic desludging, pit emptying and transportation of sludge and FSM services can be provided to the families practising OD.

Overall the PRIs/Sarpanch can create an enabling environment and help build capacities of key stakeholders to plan, implement and monitor IEC activities in the village.

Key thematic areas for messaging



Key messages which the PRI/Sarpanch may use are:

Water			
Water security	Water safety	Water conservation	O&M of water supply scheme
▸ Importance of safe and adequate water for better health ▸ Importance of sustaining water resources ▸ Cleanliness of water bodies/ no waste disposal in water bodies ▸ Maintain cleanliness around the source and in the catchment area ▸ Water scheme details and their relevance ▸ Promote Shramdaan ▸ Promote household water connections ▸ Paying water tax and being aware of the cost of safe water	▸ What is safe water ▸ Health benefits of safe water ▸ Safe storage and handling of water at the HH level ▸ Regular testing of water sources	▸ Importance of water as a precious resource and its judicious use ▸ Avoid misuse and wastage of water ▸ Rainwater harvesting / harvest every drop ▸ Revive traditional methods of water conservation	▸ The GP's/ community's contribution to O&M ▸ Value and pay for water for long-term durability of the water supply scheme ▸ Ownership of schemes by protecting the water infrastructure from damages and theft

Sanitation				
Sanitation and hygiene practices	Solid and liquid waste management	Plastics	Menstrual waste management	Faecal sludge management
▸ Regular use of toilet by everyone ▸ All children, age 3 onwards to learn how to use a toilet for defecation with the guidance of a caregiver ▸ Child faeces to be disposed of safely in a toilet	▸ Different ways of managing organic and inorganic wastes and solid waste ▸ Proper disposal of wastewater ▸ Reuse of greywater	▸ Say no to plastics ▸ Reduce: Carry your own cloth or paper bags. Avoid products with lots of plastic packaging ▸ Reuse: Reuse plastic jars, bottles or containers for storage.	▸ Do not throw used cloth/ menstrual waste materials in open areas, like ponds, rivers fields, shallow burial or do not burn them or throw them into toilets which will block the toilet	▸ Break taboos around pit emptying ▸ Set up a system for periodical emptying of pit ▸ Desludging of septic tanks ▸ Safe FSM

▸ Hand washing with soap at critical times- after defecation, before having food ▸ Maintain and keep toilets clean and functional ▸ Retrofit and repair toilets if there are technical aberrations ▸ Inform people of the availability of alternate financing for sanitation		▸ Recycle: Recycling plastic into storage bottles, toys, buckets and other usable items ▸ Recover: Use of waste as fuel substitute	▸ Ensure that the process of disposal and destruction of used menstrual materials is done with minimal human contact and with minimal environmental pollution	

14.2 Communication approaches

The main communication approaches suggested to reach out to the audiences/stakeholders at all the different levels are advocacy, interpersonal communication and social and community mobilization, supported and reinforced by multiple media.

Advocacy: Advocacy approaches are employed to influence and impact policy formulation, legislation, political issues and other areas of leadership that influence WASH practices. Advocacy with key stakeholders can provide high visibility to issues and help redefine public perceptions and is an important tool for PRIs.

Community mobilization and social mobilization: Community mobilization allows community members to identify critical issues related to water, sanitation and hygiene and reach a decision on their own. It is also a form of social mobilization that recognizes that sustainable social and behaviour change requires collaboration at multiple levels- and that partnerships and coordination yield stronger impacts than isolated efforts.

Interpersonal communication (IPC): IPC is a two- way interaction that facilitates exchange of ideas, reinforces hygiene practices, builds up demand for sanitation facilities and helps in providing detailed information to the audience/stakeholders. It also allows for immediate feedback on ideas, messages and practices. Community influencers, such as nigrani samiti members, swachhagrahis, other front-line workers and SHG members, engage with households through discussions and group meetings to promote positive sanitation behaviours and safe sanitation.

Mid media, outdoor- media and mass media: These media reinforce messages shared through IPC and community mobilization and raise awareness about key behaviours and government programmes.

- TV/Radio/Print: Local cable TV channels, radio and print mediums may be used to amplify the messages

- **Community radio:** Community radio is a very powerful means to reach out to a large number of people with messages contextualized in their local culture and needs.
- **Outdoor media:** According to the context, stakeholders and resources available, hoardings and wall paintings can also be used to mobilize the community.
- **Mobile vans:** These are mobile exhibition vans. They contain information about water and sanitation practices, toilet technology, printed, digital and audiovisual communication material.
- **Folk media:** Local artists, singers, *naatak mandlis* for song, dance and drama performances, puppet shows, magic shows, to deliver messages to the community and to encourage behaviour change
- **Digital media:** Mobiles are increasingly finding traction in rural India. Mobisodes (short AV clips) can be shared over mobile phones along with audio- visual messages.

Capacity-building: for the effective implementation of communication activities, capacity-building of key stakeholders needs to be carried out at various levels.

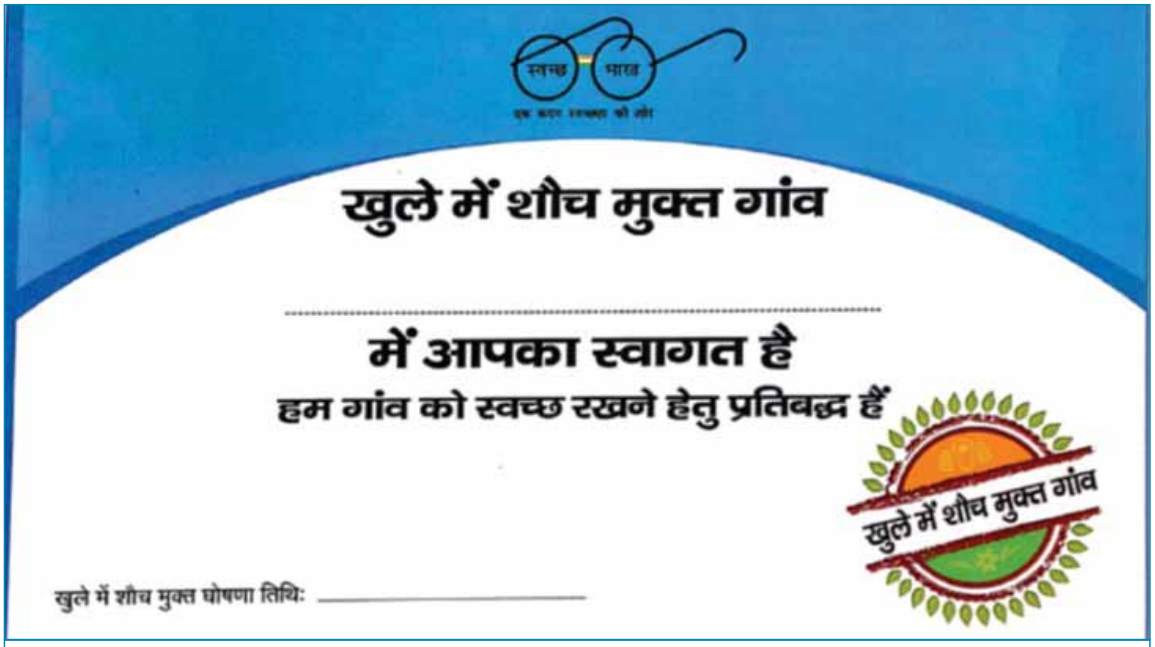
14.3 Wall paintings to be placed at various places in village (example))

At GP building, market, bus stand, and other public places

At individual toilets, public toilets

At garbage disposal, public places, market, gram panchayat building

At public places, schools, community centres, bus stand, etc.



At the entrance of the village

14.4 IEC planning at village level

Communication approaches are interrelated and interactive. When strategically combined through an effective IEC plan and its implementation, it helps in the promotion and sustained adoption of positive WASH behaviours. It is important that the IEC plan is developed keeping in mind the local contexts and that its messages and communication channels are tailored according to the nature and size of the population of a particular area.

Key steps include:

Step 1: Identify desired behaviour

In order to establish the Sujal and Swachh Gaon theme, it is important to identify what changes are required and what actions need to be taken at the household and community levels. These will be chosen from the key thematic areas identified above.

Step 2: Identify barriers to desired behaviour

Many factors such as lack of information, motivation and knowledge and negative attitude to certain sanitation and hygiene practices impact the actions (with regard to sanitation) of an individual. Thus, it is important to identify barriers corresponding to each desired behaviour.

Step 3: Audience segmentation and stakeholder mapping

It is important to identify whose behaviour needs to be changed and by whom.

Stakeholder mapping is critical to identifying key stakeholders who can drive the planning and implementation of the IEC/BCC interventions. It is important to identify a key messenger who will communicate the messages effectively. There are some messages which may be more effectively communicated by the Sarpanch, some may be more effectively communicated by an ASHA

worker and technical messages regarding water supply may be best communicated by PHED/ RWSD. Influential villagers can play a very important role in communication and motivation as they are the first responders in most situations.

New stakeholders may need to be identified for fulfilling the needs of a Sujal and Swachh Gaon. Their respective roles and responsibilities at different levels need to be defined. Capacity-building of all the key stakeholders is an imperative.

Step 4: Develop message

It is important to identify appropriate messages with reference to desired behaviour and identified barriers. The key features of a good message are:

1) The message should be positive

2) The message should be applicable and acceptable

3) The message should be specific

Key communication messages need to be designed to address the identified behavioural barriers within the local context

Step 5: Identify tools to communicate

Every message should be communicated to the community using media materials. The Government, BRC, IEC agencies have a range of materials including posters, videos and flash card stories at their disposal.

Step 6: Identify activity

A range of activities, such as home visit, focused group discussion, gram sabha, meeting or organizing events etc. can be undertaken to communicate the message. Key considerations for these activities are: 1) identifying a suitable time and day for the community; 2) preparation before, during and after the visit and 3) creating an enthusiastic environment for the positive reception of messages.

The following matrix presents the steps described above

Messages and mediums for ODF S (examples)

Desired behaviour	Key messages to address barriers to desired behaviour	Audience/ stakeholders	Communication channels	Communication materials/tools
▸ Toilet access for new households ▸ Maintenance and cleaning of toilets ▸ Community based ODF surveillance	▸ We see that nobody defecates in the open	▸ PRI members and the ODF surveillance committee		▸ Prabhat Pheri linked with morning follow-up ▸ Swachhata rath ▸ TV radio spots ▸ Community radio

Desired behaviour	Key messages to address barriers to desired behaviour	Audience/ stakeholders	Communication channels	Communication materials/tools
▸ Continued toilet use ▸ Maintaining social decorum in terms of sanitation practices	▸ Regular toilet use by all ▸ My toilet my responsibility and cleaning toilet is easy	▸ Men, women, children	▸ Interpersonal communication, Mid media, Mass media	▸ Demonstration ▸ Sanitation voting(schools) ▸ Post cards
▸ Safe sanitation practices ▸ Demystifying the twin pit technology ▸ Safe pit emptying and disposal (FSM) ▸ Options to upgrade toilets and for retrofitting of toilets	▸ Twin pit is simple and long lasting ▸ Emptying a leach pit is safe and easy ▸ Liquid waste/ sludge is harmful and needs safe disposal	▸ Household heads ▸ PRI members	▸ Interpersonal communication, mid media, mass media	▸ Demonstration of pit emptying technology and retrofitting ▸ Film show/ flipcharts ▸ Village cleanliness day
▸ Safe disposal of child excreta	▸ Child faeces is harmful and needs to be disposed of in the toilet	▸ Caregivers	▸ Interpersonal communication	▸ Women group meetings ▸ Flipcharts ▸ Songs and dramas ▸ Community Radio
▸ Hand washing with soap at critical times- after defecation and before having food	▸ Clean hands safe hands	▸ General public (men and women) ▸ Caregivers ▸ School children	▸ Mass media, ▸ Mid media, ▸ Interpersonal communication	▸ TV/radio spots ▸ Community radio programmes ▸ Wall painting ▸ Flip chart (for IPC sessions) ▸ School rally
▸ Segregation of bio-degradable and non-organic solid waste at the household level	▸ Segregation at the household level eases the entire process of managing waste in the subsequent stages	Women	Interpersonal communication, print media	Home visits, FGDs, wall paintings, flipcharts

Desired behaviour	Key messages to address barriers to desired behaviour	Audience/ stakeholders	Communication channels	Communication materials/tools
▸ Use of biogas for cooking, electricity, fuel and bio-resource electricity	▸ No smoke during the use of biogas stoves, biogas plants save a lot of cooking time, biogas can generate electricity and good manure for agriculture	▸ Heads of families, women, institutions, commercial units	▸ Interpersonal communication, outdoor media, mass media	▸ Home visits, FGDs, flex, banner, audiovisual clips
▸ Adopting the greywater management technology	▸ Various technologies are available for greywater management at the household and community levels	▸ Men, women, ▸ PRI members ▸ School children	▸ Inter personal communication, mass media	▸ Demonstration of technology, FGDs, audiovisual clips
▸ Hygienic collection and transport of water ▸ Hygienic storage and handling of water ▸ Efficient collection, recharge and use of rainwater	▸ Minimize the risk of water contamination (throughout the entire process of delivering water- from collection to drinking) ▸ Consequences/ risks of drinking contaminated / non-potable water ▸ Measures to keep water safe- that reduces the risk of contracting water- borne diseases. ▸ Rainwater harvesting for groundwater recharge	▸ Men, women, ▸ PRI members ▸ School children	▸ Interpersonal communication, outdoor media, mass media	▸ Home visits, FGDs, flex, banner, audiovisual clips

Desired behaviour	Key messages to address barriers to desired behaviour	Audience/ stakeholders	Communication channels	Communication materials/tools
▸ Maintaining menstrual hygiene by using clean clothes or menstrual pads ▸ Disposal of pads or rags in the latrine or burial of pads and rags if disposal in the latrine is not possible	▸ Cleaning the cloths in water using soap and drying them in the sun ▸ Store the cloths in safe places to avoid germ or insects ▸ Dispose of sanitary napkins scientifically	▸ Men, women ▸ PRI members and school children	▸ Interpersonal communication, outdoor media, mass media	▸ Home visits, FGDs, flex, banner, audiovisual clips

14.5 Monitoring mechanism for IEC

Considering the importance of IEC in the creation of Sujal and Swachh Gaons, a robust mechanism for monitoring IEC activities is crucial. The IEC activities need to be monitored at various levels for their relevance and appropriateness in terms of local contexts, targeted participants, media and tools selected to convey messages, impact activities and IEC expenditure.

The following schematic presents an indicative mechanism for monitoring IEC activities for Sujal and Swachh Gaons at four levels: state, district, block and GP level. The blocks will need to regularly review GP-level IEC activities through review meetings, field visits, APP data, etc. The blocks will consolidate block level reports and submit those to districts, which in turn will submit consolidated reports to the state. The districts will also conduct review meetings and field visits for monitoring IEC activities and will also periodically review the APP data. GPs will be responsible for monitoring the field-level implementation of IEC activities.

Indicative monitoring mechanism

The GPs are expected to prepare the Sujal and Swachh Gaon action plan through a community-led process (as described in chapter 15). A village-level IEC plan is prepared during the planning process which determines the timeline, appropriate activities for IEC, implementation responsibility, monitoring responsibility and resources for each activity.

It is the GP's responsibility to monitor these activities. The GP needs to monitor the roll out of required capacity-building activities, resource mobilization as proposed in the plan (funds, IEC material and tools), regular review of swachhagrahis' work, effective implementation of the activities in the light of expected outcomes, etc. The role of the Sarpanch and PRIs is crucial in monitoring IEC activities meant for changing people's negative attitudes to certain sanitation practices.

Indicative monitoring mechanism

State level	District level	Block level	GP level
▶ State level MIS ▶ App based monitoring ▶ Review meetings (State and regional) ▶ Field visit	▶ Review meetings (State and regional) ▶ Field visit ▶ App based monitoring ▶ Monitoring work of swachhagrahi ▶ Impact assessment of ODF Plus and water supply	▶ Review meetings (State and regional) ▶ Field visit ▶ App based monitoring ▶ Monthly periodic reporting	▶ Review meetings with communicators ▶ App based monitoring ▶ Monthly periodic reporting ▶ Monitoring work of swachhagrahis regarding ODF Plus and water supply

GP level activities for rolling out

- Preparation of IEC plan under Sujal and Swachh Gaon action plan
- Finalization of implementation and monitoring responsibilities under the plan
- Monitoring of resource mobilization as proposed in the plan (funds, IEC material and tools)
- Monitoring of Swachhagrahis' work
- Monitoring roll out of required capacity building activities

14.6 Roles and responsibilities of a PRI/sarpanch with regard to IEC

A sarpanch plays a critical role championing issues of water and sanitation and being the role model for the community. The key role is that of an advocate, motivator, influencer and enabler supporting people in understanding core water sanitation and hygiene issues and acting upon them.

A. Community engagement

- Trigger and mobilize communities on water and sanitation issues.
- Have regular interactions and meetings with families and community on water and sanitation.
- Mobilize teachers and school children to conduct water sanitation theme events in schools.
- Organize water and sanitation thematic gram sabhas and VHNDs, rallies, melas, bringing high visibility to water and sanitation issues.
- Organize water and sanitation thematic gram sabhas and VHNDs, rallies, melas, bringing high visibility to water and sanitation issues

- Reach every section of the community, to motivate and mobilize for *shramdaan* and other voluntary activities. Gain their participation in planning, implementing and management processes.

B. Build a skilled team of influencers and mobilizers in addition to swachhagrahis

- Create a team from within the community to act as community messengers. They may communicate effectively, initiate dialogue on the issues and influence the decision-making processes at village level. They can be GP members/ ward members; *swachhagrahis/jal doots*; village-level frontline workers: AWWs, ASHA, *gram sevaks*, volunteers; SHGs/CBOs/institutions; youth.
- Facilitate their capacity-building in community mobilization, interpersonal communication and conducting of IEC activities.

C. Create an enabling environment for planning and implementation of IEC activities

- Facilitate development of village-level IEC plans that get integrated with the action plans of water and sanitation.
- Ensure village IEC plan has allocation of resources.
- Coordinate and facilitate logistics for organization of IEC events in the village as per plan.
- Ensure availability of IEC resources such as pamphlets, leaflets, posters flex boards, IPC tools, etc.
- Coordinate with district administration for facilitating IEC activities.
- Felicitate village level water and sanitation champions at community events and functions.

Monitoring

- Ensure village-level teams attend capacity-building programmes.
- Ensure front-line workers/*swachhagrahis* effectively implement communication interventions with regular community meetings and home visits.
- Ensure IEC activities are implemented as planned and on time.

IEC resource materials

S.No.	Topic	IEC material
1.2	Importance of water and sanitation service delivery	▸ Short film 'Darwaza band', part 1 and 2, MDWS ▸ PSAs on Water, MDWS ▸ PSA on Water Conservation, MDWS ▸ PSA on Demand for VWSC, UNICEF Delhi ▸ PSA on water for Sarpanch, UNICEF Delhi ▸ Case study of KasthuniPurab GP, Musafirkhana block, Amethi district, Uttar Pradesh
1.3	New Central Government Piped Drinking Water Programme for sustainable water supply	▸ No material available as guidelines still to come/SWAJAL guideline film available for reference
1.4	Drinking water availability and demand in the village	▸ Uttarakhand Testimonial (Water), UNICEF Delhi ▸ PSA on Kitanu kaa safaya (Water), UNICEF Delhi
1.5	Strengthening of the groundwater sources by using various methods of rainwater harvesting	▸ IEC material with Ministry, Rainwater harvesting and Drip Irrigation (Yugal Joshi) ▸ Posters on greywater UNICEF Delhi and Rajasthan ▸ Groundwater Experiences in Maharashtra- GSDA
2.1	ODF S	▸ One card on steps of twin pit toilet construction, UNICEF Delhi(Flex on steps of toilet construction) ▸ Handbook on how to construct twin pit toilet, UNICEF Delhi ▸ Akshay bhoomi film on twin pit toilet MDWS (PSA on twin pit toilet – akshay, bhumi) ▸ Amitabh movie on twin pit toilet MDWS (PSA on twin pit toilet –Amitabh) ▸ Film on retrofitting and other faulty contractions under development (UNICEF Delhi) ▸ ODF S poster UP, Pamphlet (ODF S Poster and Pamphlet) West Bengal, Saucha Singh MDWS (PSA Saucha Singh) ▸ PSA on SBM guidelines, UNICEF Delhi ▸ Simple Toilet (SopaSandas) Construction Trailer (Narvekar) ▸ Feature film Mukh Dikhayi ▸ How a Twin pit toilet works.mp4

S.No.	Topic	IEC material
2.2	Status and operational plan for solid liquid waste management	▸ Flier on ODF S and SLWM Uttarakhand Hindi in the list sent by Yugal (ODF S Flier, Uttarakhand) ▸ SLWM handbook Uttarakhand, Hindi in the list sent by Yugal (SLWM Handbook, Uttarakhand) ▸ Menstrual Waste Management Poster West Bengal ▸ Waste disposal poster Bihar ▸ Kachre se Kamai – Earn from waste (Hindi) ▸ Sabala Sanitary napkins PDPL DIST
2.3	Greywater management and faecal sludge management	▸ FSM poster Rajasthan, Greywater management Rajasthan (FSM Flex Rajasthan), Faecal sludge management Video
2.4	Resource envelope for water and sanitation facilities	▸ Entire set alternative financing posters available in Marathi and English (UNICEF Delhi, Water.org) ▸ Water.org PPT
2.5	Information, Education and Communication for Sujal and Swachh Gaon	▸ 4+1 IEC posters ▸ PSA on Safe storage and handling of water ▸ PSA on water quality ▸ PSA on keeping water sources clean ▸ IEC planning template Delhi and PriMove ▸ ODF Plus: Continuous usage, HWWS with soap, Maintenance of toilets, Safe disposal of child faeces, SWM posters available Bihar and West Bengal UNICEF Rajasthan (ODF Plus posters UNICEF Bihar, West Bengal and Rajasthan) ▸ All other material mentioned in other sessions can be used here ▸ Safe storage and handling of water posters water quality parameter PPT and video

CHAPTER 15

COMMUNITY-LED ACTION PLANNING PROCESS FOR SUJAL AND SWACHH GAON AND SUPPORT FROM DISTRICT

Key learning points

- Importance of village level planning process for the creation of Sujal and Swachh Gaon
- Steps of and tools for community-led planning process

15.1 Introduction

Community-led action planning has been accepted as a tool for articulating and consolidating water supply and sanitation related demand and for developing a plan for 'Sujal and Swachh Gaon' at the village level. It is a participatory process at the village level which mobilizes the community into immediate action and also generates a time bound implementation plan. It lists the actions needed for the creation of Sujal and Swachh Gaon and also maps the resource envelop for each activity. The end product along with mobilization should be a simple implementable plan specifying what needs to be done by whom and when to achieve the Sujal and Swachh Gaon status. The gram sabha's and the GP's approval ensures community ownership and grants the required mandate. It also works as a tool to provide targeted response.

This chapter elaborates on the need for a community-led planning process for a Sujal and Swachh Gaon and the process to be followed before, during and after the planning process.

15.2 Why Sujal and Swachh Gaon action plan?

Sujal and Swachh Gaon action plan helps to:

- Compile information on water and sanitation facilities available in the village, its present status and usages.
- Inform the people in a community when their village has being declared s ODF. Also, remind them of their roles and responsibilities in maintaining and sustaining WASH facilities.
- Understand issues in the O&M and sustainability of water supply and sanitation facilities through participatory assessments.
- Identify solutions to the issues to ensure effective service delivery.
- Finalize responsibilities of the GP, nigrani samiti, swachhagrahis etc. for the implementation of the Sujal and Swachh Gaon action plan.
- Form nigrani samitis, select swachhagrahis and clarify their roles and responsibilities.

The Sujal and Swachh Gaon action plan will be compiled at the block and district levels which will help in the preparation of the district water and sanitation roll out plan. Detailed surveys will be conducted and DPRs will be prepared for SLWM, FSM, PWS etc.

As given in diagram 15.1 ODF S, three action plans: safe and secure drinking water supply action plan, ODF S action plan and IEC action plan, will be prepared through this planning process.

15.3 Steps of the planning process

As presented in the schematic, activities for effective implementation of the planning process can be divided into three stages: before, during and after planning process.

The three stages are described below:

15.3.1 Before the planning process

Following are the key activities which need to be carried out before the planning process

1. Informing the GP about the planning process

A letter should be issued by the district to inform the GPs about the village-level planning process. Objective of the planning process along with the details should be mentioned in the letter. The GP should also be informed about village-level meetings that need to be organized to prepare for the planning process.

2. Pre planning meeting

Pre-planning meeting should be organized at the village level to simplify the planning process and ensure involvement and participation of community. Ensure that the GP members, front-line workers, CBOs, key decision makers, nigrani samiti and swachhagrahis etc. participate in the meeting. During the meeting, share the objectives and details of the activities which will be carried out and the role of the stakeholders in the planning process. At the end of the meeting, request the GP to form a facilitator team for facilitating the planning process.

3. Forming and training the facilitator team

Participation of front-line workers, SHG members, youth groups etc. is important to effectively facilitate the village-level planning process. This will help in reaching out to all sections of the rural community and ensuring reliable collection of data. After the pre-planning meeting, ensure that facilitator team is properly identified by the GP. After the formation of the team, proper training should be given to the team members. During this training, discuss how to apply for various participatory tools and fill in various formats during the assessment of water and sanitation facilities.

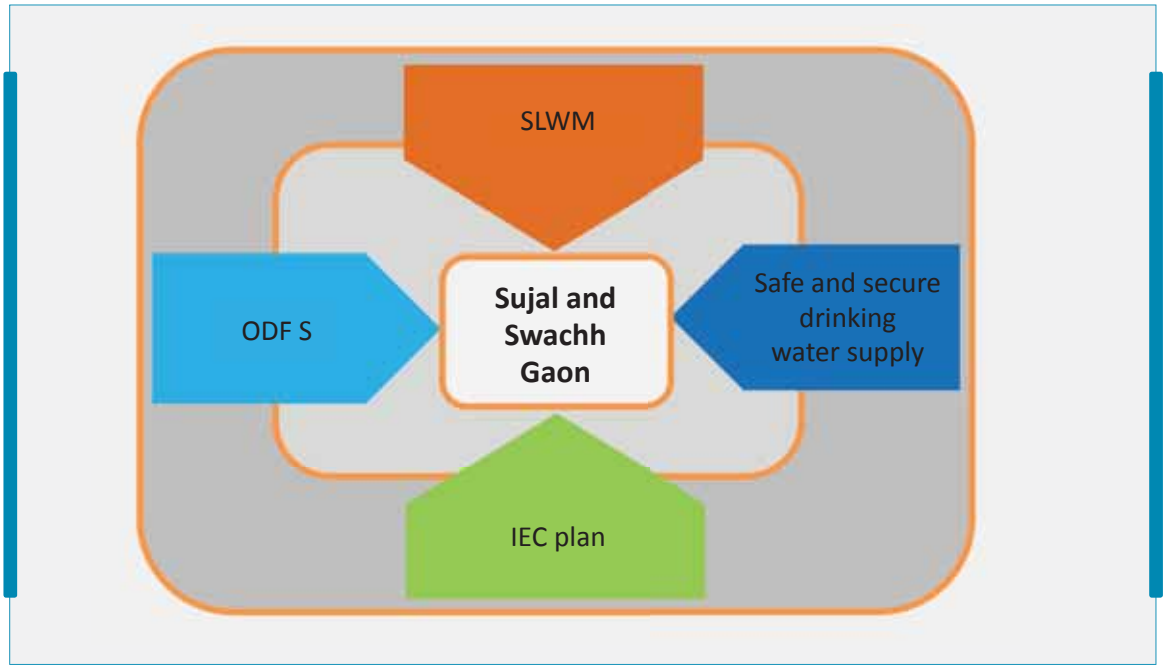
4. Secondary data-collection

To understand the water and sanitation status of the village secondary data needs to be collected before the planning process. The following details should be collected from the GP:

- List of families in the village
- List of drinking water sources
- Families with/without toilet
- List of institutions (schools, anganwadis, health centre etc.)
- Community sanitary complex and list of shared toilets
- List of GP members with contact numbers
- List of village-level officials with contact numbers
- List of nigrani samiti members, swachhagrahis (if available) with contact details
- List of CBOs

15.3.2 During the planning process

It is recommended that in villages with less than 250 families, a one-day process be conducted and in the villages with more than 250 families, a 2-day process be organized. The following chart explains the 2-day process with participatory tools, its objectives and the methodology for its application during the planning process.



Methodology for 2-day planning process

No	Tool	Objective	Methodology	Remark
Day 1				
1.	Primary meeting	▸ To clarify the objective of the planning process. ▸ To make villagers aware of the process to be carried out. ▸ To inform the villagers and the facilitator team about their respective roles during the planning process	▸ Ensure that the facilitator team, villagers and key village-level stakeholders are present during the meeting. ▸ Share the objectives, details of the planning process and the role of the villagers and facilitators' team. ▸ Divide the facilitator team according to the number of wards, determine the route for household level assessment	-
2.	Social mapping	▸ To map the village structure, water and sanitation infrastructure ▸ To understand the status and issues of water supply and sanitation in the village	▸ Determine the village boundaries with the help of a stick ▸ Locate various locations within the boundaries ▸ Use different colours for different components. For example, use blue for water bodies, yellow for OD sites, etc. ▸ Try to involve as many people as possible ▸ The members of the documentation team will simultaneously draw the map on a paper	

No	Tool	Objective	Methodology	Remark
3.	Assessment of water supply facilities	▸ To understand the current status of drinking water sources and issues associated with it. ▸ To understand the current status of piped water supply scheme (if available) and issues in its regular O&M. ▸ To identify solutions for better service delivery	▸ Ensure that the format for assessment is available with the team. ▸ Ensure that GP members, water person, VWSC members and village-level officials participate during the assessment. ▸ Start the assessment from the source and then proceed to the mouth. ▸ Determine methods for source sustainability if the area does not have sufficient water. ▸ Assess the water supply system with the help of the checklist and identify the issues associated with each component (pump house, distribution line etc.) of the water supply system, rising main and ESR/GSR	The checklist for the assessment of the water supply scheme is attached as Annexure 4
4.	Water quality assessment	▸ To understand the process of village- level water quality monitoring and surveillance ▸ To identify issues that prevent the supply of safe drinking water and provide solutions thereby	▸ Ensure that the prescribed format for the assessment is available with the team ▸ Ensure that the GP members, water person, VWSC members and village-level officials participate during the assessment. ▸ Compile a separate list of issues identified regarding safe water supply during the assessment of water supply facilities. ▸ Assess the process (regular water testing, storage of TCL, chlorination, record maintenance etc.) along with the GP and water person for safe water supply with the help of the prescribed format. ▸ Prepare the list of issues in safe drinking water supply	The assessment format is attached as Annexure 5

No	Tool	Objective	Methodology	Remark
5.	Seasonality mapping	▸ To gather season-wise information on the availability and quality of water, health trends, tariff collection mechanism, etc. ▸ To understand water supply and sanitation related issues in a particular season and identify the causes thereby	▸ First draw the seasonality map in a tabular form. The months should be written in a horizontal row and the discussed components in a vertical column. ▸ Then discuss the vertical component one by one depending upon the seasons as marked in the horizontal row. ▸ Do not help the community, let them discuss and fill out the table	
Day 2				
6.	Resource mapping and water budgeting	▸ To map available resources in the village including rivers, forests, geographical strata, etc. ▸ To identify the scope for water recharge and storage measures and water supply sources, etc. ▸ To prepare a water budget for drinking water requirement	▸ Initially gather at the location from where the entire village and its resources are visible. ▸ Initiate the drawing process by marking the village boundary and directions. ▸ Involve farmers from different areas to make the process effective. ▸ Discuss the issues and challenges faced by the community in preserving/retaining natural resources to ensure source sustainability ▸ Prepare source-wise drinking water budget in the prescribed format	The format for water budget preparation is attached as Annexure 1

No	Tool	Objective	Methodology	Remark
7.	Household level assessment of WASH facilities	▸ To assess the status of water supply and sanitation facilities available at the household level ▸ To consolidate data on the status and issues of household level water supply and sanitation	▸ Ensure that each team member has a copy of the assessment format. ▸ Request team members to assess water and sanitation facilities after physical observation. ▸ Ensure that the team writes ODF S on the door of each assessed household avoid repetition. ▸ Ensure that assessment of all families is properly done by the team and that the data has been properly compiled. ▸ Determine the e total number of families with/without toilets, single pits, two pits, septic tank type toilets and families not practising safe handling and storage of water etc.	The assessment format is attached as Annexure 6
8.	Assessment of institutional WASH facilities	▸ To assess the status of water and sanitation facilities available at the institutional level ▸ To understand issues in sustainable use of water and sanitation facilities in the institutions and to come up with relevant solutions	▸ Cross check the list of institutions available in the village with the help of secondary data. ▸ Determine the route for institutional assessment. ▸ Ensure that the assessment format is available with the team. ▸ Request the team to assess WASH facilities in accordance with government norms. ▸ Identify the issues in sustainable use of WASH facilities	The assessment format is attached as Annexure 7

No	Tool	Objective	Methodology	Remark
9.	Sanitation walk	▸ To understand the status of SLWM facilities available in the village and issues associated with it. ▸ To finalize measures for effective management of solid and liquid resources at individual and community levels	▸ Determine the route and ensure that the format is available with the team before assessment. ▸ Assess the facilities for SLWM available at HH and community levels. ▸ List down the issues and determine effective SLWM measures	The assessment format is attached as Annexure 8
10.	Documentation, FGD and village meeting/gram sabha for option selection and finalizing water and sanitation interventions	To document the action plan for ODF Plus and JJM. To get the action plan approved in the village meeting/ Gram Sabha	▸ After the completion of the process compile the list of issues on chart paper or in prescribed formats. ▸ Determine the total number of families with/ without toilets, single pits, twin pits, septic tank type toilets and families practising safe handling and storage of water etc. ▸ Organize a focus group discussion (FGD) and discuss issues, with regard to each component, with the village-level stakeholders to finalize mitigation measures. ▸ Prepare the drafts of the Sujal and Swachh Gaon action plan, ODF S plan, SLWM plan, safe and secure drinking water supply plan and IEC plan) and ask for approval in a village meeting or Gram Sabha	-

Note:

1. Ensure maximum participation (of villagers) in the above-mentioned tools.

2. Organize IEC activities during the planning process to make people aware of sustainable use of water and sanitation facilities and their roles in maintaining and sustaining these facilities.

15.3.3 After the planning process

Effective implementation of the action plan is crucial. Once the planning process is over, prepare the final Sujal and Swachh Gaon action plan report and submit it to the block. Segregate the activities mentioned in the action plan as i) activities which can be implemented through community participation and ii) activities which can be implemented through various government schemes. Conduct activities that require community participation immediately. At the same time, prepare and submit proposals for other activities to mobilize funds through convergence.

15.4 GP level monitoring

GP level monitoring involves systematic recording and periodic analysis of works/ activities/ processes and undertaking appropriate measures based on the analysis. GP level monitoring is done at every step by the Sarpanch and GP members to check whether the implementation is on track and suffices quality standards. The methods of GP level monitoring are as follows

- Display of the action plan with updated status of implementation at public places
- Review meeting/ workshop
- Comparative study of photographs (then and now)
- Preparing, reading and discussion monthly reports
- Review, assessment and FGD about the on-going works/ processes

SECTION 5

SWACHHAGRAHIS

- Sustaining Water and Sanitation Outcomes through Swachhagrahis
- Function of Swachhagrahis in Sujal and Swachh Gaon
- IEC and Community Mobilization Activities in Sujal and Swachh Gaon

CHAPTER 16

SUSTAINING WATER AND SANITATION OUTCOMES THROUGH SWACHHAGRAHIS

Key learning points

- Role of swachhagrahis in creation of Sujal and Swachh Gaon
- How to continue engagement of swachhagrahis
- What are the capacity needs of swachhagrahis for Sujal and Swachh Gaon creation
- Toolkit for swachhagrahis, including IEC material
- Performance based incentive structure for swachhagrahis
- Use of App/ dashboard for monitoring progress

16.1 Background

Swachhagrahis are the foundation of the Swachh Bharat Mission (SBM) and play an important role in changing people's attitude to WASH. They play a supportive role in creating, maintaining and sustaining water and sanitation facilities in GPs. So far, they have effectively performed their role in implementing various activities like organization of sanitation campaigns, IEC and IPC activities, motivating families into constructing and using toilets, promoting and facilitating village cleanliness etc.

> ***Just like the Satyagrahi was at the core of India's quest for Swarajya, Swachhagrahi is at the core of our dream of a Shreshtha Bharat***
>
> Hon. Shri Narendra Modi, Prime Minister of India, Tweet on 2 October 2017

Considering the swachhagrahis' efforts, the Government of India has decided to continue engaging swachhagrahis at the village level to bring about changes in attitudes with respect to sustainable water and sanitation services. This chapter provides details about the procedure for continuing engagement of swachhagrahis, their role in the creation of a Sujal and Swachh Gaon and the incentive structure for performing various task related to water and sanitation services.

Who is a swachhagrahi?

A swachhagrahi is a volunteer (preferably a woman) from any background including a local ASHA worker, auxiliary nurse midwife (ANM), anganwadi worker and staff, water line man, pump operator, member of CSOs/youth organizations or anyone from a village s who plays an important role in the O&M of WASH facilities and receives incentives based on his/her performance.

16.2 How to continue engagement of swachhagrahis

Swachhagrahis should continue to be engaged by the District Water Sanitation Committee (DWSC) on recommendation of the GP. GPs must ensure equal participation of both men and women when recommending swachhagrahis. GPs with two or more swachhagrahis should ensure that at least one of them is a woman. The GP/VWSC can recommend swachhagrahis for identification of beneficiaries, motivation, assistance in water and sanitation related IEC, supporting the GP in maintaining records, supporting source sustainability and ensuring sustained latrine by each household in the village. Each village shall have at least one swachhagrahi. The swachhagrahi shall be a voluntary position with high visibility and the position has been created in the spirit of social service and not employment. This message has to be clearly spread in the GP during the selection process itself.

Qualifications for engagement as swachhagrahis:

- The individual must be a resident of the GP in which she/he is being engaged and serve on a full-time basis.
- She/he must have access to toilet and should not be practising OD.
- Good command over local language/dialect will be preferable.

In view of additional responsibilities of the swachhagrahi regarding water and sanitation, the DWSC can instruct a GP to review the capabilities and willingness of the existing swachhagrahis/ swachhagrahi. The GP can then choose to either continue with an existing swachhagrahi or appoint a new one. In either case, the capacities of the swachhagrahis must be built by the state.

16.3 Toolkit including IEC material for swachhagrahis

The swachhagrahi should be provided a toolkit consisting of:

- Resource material for community mobilization (Saarthi)
- Resource material for safe toilet technology facilitation
- A cap with SBM (G) branding
- A torch and a whistle
- A T-shirt (male) / Apron (Female) with SBM (G) branding

16.4 Capacity-building of swachhagrahis

The following trainings can be organized by the state/district by engaging an empanelled training agency or by using the services of trained government trainers.

Trainings on water	Trainings on sanitation
▸ Implementation of JJM ▸ Water budgeting and conventional measures ▸ O&M of piped water supply schemes and water quality monitoring and surveillance	▸ Retrofitting of toilets and issues of the ODF S ▸ SLWM, MSM, FSM
Trainings on cross cutting interventions ▸ Village-level planning process for Sujal and Swachh Gaon ▸ IEC tools and their implementation	

Further, they must be trained to explain why the ODF momentum should be sustained.

16.5 Incentive structure

As per the guidelines, swachhagrahis can receive up to INR 150/- for the construction and sustained use of each household toilet initiated by him/her. This could either be given as a lump sum amount on achievement of a particular milestone or in phases from the IEC budget. Often the swachhagrahi also receives an award amount, as decided by the state /district, for each ODF declared village.

For sustaining the water and sanitation status of a village, swachhagrahis will undertake the following activities and may receive payment from the IEC budget (subject to confirmation on achievement of the same). The incentive structure may vary from one state to another, based on state level decisions.

Activities	Allowable payment of incentive
Sanitation (Swachh Gaon)	
1. Geotagging each toilet in the village	Up to INR 5/ toilet
2. First verification of each household in the village (within 3 months of the village attaining the ODF status) along with IPC/ IEC activities to ensure community awareness and participation and to sustain the ODF S status	Up to INR 10 per household (verification and IPC)
3. Second verification/ subsequent sustainability verification of each household (within 9 months of the village attaining the ODF status) along with IPC/ IEC activities to ensure community awareness and participation and sustain the ODF S status	Up to INR 15 per household (verification and IPC)
4. Ensuring conversion of a household's dysfunctional toilet to a functional one. Ensuring the repair of: ▪ broken pans, ▪ choked pipes, ▪ blocked drains and ▪ broken doors/walls/roofs, etc.	INR 25/ toilet

Activities	Allowable payment of incentive
5. Ensuring retrofitting of previously constructed toilets (as per safe technology). Ensuring the: ▪ addition of a second pit to a single pit toilet, ▪ construction of a soak pit with a septic tank and ▪ construction of separate pits for in situ toilets, etc.	INR 25/ toilet
6. Ensuring the following SLWM activities in the village and creating public awareness on the O&M of the assets created: ▪ construction of pucca and covered drains(one time), ▪ construction of community soak pits (one time), ▪ construction of community compost pits (one time) and ▪ construction of community biogas plants	INR 200 per village (assuming that the village comprises of 50-100 households)
7. Ensuring activities for visual cleanliness in the village: ▪ Maintenance of drains (monthly) ▪ Maintenance of biogas plants (monthly) ▪ Cleaning of ponds, drains, streets, local markets, etc.- fortnightly. ▪ Early morning/evening nigrani, along with the other nigrani samiti members weekly. ▪ Organizing ratri chaupals/ village meeting on the issue of Swachhata/ ODF sustainability monthly	INR 200 per village (assuming that the village comprises of 50-100 households) per activity
8. Facilitating ODF sustainability activities: ▪ Repair and cleanliness of toilets in institutional buildings schools, PHCs, community toilets and sanitary complexes, anganwadi centres on a monthly basis. ▪ Observance of days of national importance, such as ▪ Independence Day, Republic day as ODF day/ Swachhata day to commemorate the ODF status of the village. ▪ Construction (one time) and maintenance (monthly) of model toilets at the GP level ▪ ODF branding in the village- wall writings, displaying a board announcing the ODF status of the village ▪ Passing of resolution in the gram sabha for the following: ▪ ODF declaration of the village ▪ ODF verification of the village ▪ Any new family coming to the village after it has attained the ODF status ▪ Households need to essentially construct their toilets by themselves	INR 200 per village (assuming that the village comprises 50-100 households) per activity
9. Facilitating self-construction of toilets by any new families/ households post the ODF status of the village	Rs.25/ toilet

16.6.2 Non-financial incentives

These include recognition by the Government at different levels. They are felicitated by different public and private organizations (e.g. recognition/awards by the Government, etc.). Some creative rewards have also been introduced in different states and districts (for example, the champion swachhagrahis will have the opportunity of having two meals with the District Collector). Some states also choose to give incentives such as passes for/ discount on travel by public transport/ train, insurance facilities (medical and / or life insurance) and the Atal pension scheme etc.

16.6 Use of app/dashboard for monitoring

The Department of Drinking Water and Sanitation (DDWS), Ministry of Jal Shakti, Government of India, is the nodal department for monitoring progress under the SBM at the central level. The ODF Plus application has been developed by the DDWS in technical collaboration with the NIC. The primary focus of this app is to update the data and images for the ODF Plus baseline and ODF Plus messages parameters.

Steps:

- The first step in using the app is to acquire user approval from the District. Registration of users on the app needs to done through SBM MIS.
- The second step is to allocate ODF Villages (verified and declared) to approved users
- After the registration and allocation of villages, the user has to download and install the app by using the link- https://sbm.gov.in/ODF Plus
- Then the user has to complete the application logging process
- Then, the following details regarding two important parameters of the ODF Plus need to be uploaded by the user on the app
- ODF Plus Messages (4+1) – upload photos of ODF Board, wall painting on uses- 1, wall painting on uses- 2, all painting on the compost pit, wall painting on safe disposal of child faeces
- ODF Plus Baseline – step 1 is to capture the ODF baseline data that consists of total units, functional units, MNREGA, size (in feet); step 2 is to upload the ODF Plus baseline images (images of functional units)

CHAPTER 17

FUNCTIONS OF A SWACHHAGRAHI FOR CREATION OF A SUJAL AND SWACHH GAON

Key learning points

- Functions of the swachhagrahi in the creation of a Sujal Gaon
- Functions of the swachhagrahi in the creation of a Swachh Gaon

This chapter describes the functions of swachhagrahis in the creation of a Sujal and Swachh Gaon.

17.1 Functions of swachhagrahi in the creation of a Sujal Gaon

1. Awareness generation/home visits, etc. on issues pertaining to water conservation
   - Motivating farmers to choose their crops more wisely so that water utilization is optimal
   - Planting trees that consume less water
   - Organizing/reviving traditional festivals/events associated with rain, trees, ponds, wells, rivers, etc.
2. Preparing and maintaining an inventory of existing systems/mechanisms for water conservation in villages
3. Supporting village water and sanitation committees (VWSCs) in conducting Sujal Gaon activities
4. Mobilizing community participation for activities in the village/gram panchayat (GP) in the following areas of intervention:

4.1 Water conservation and rainwater harvesting

- Build awareness in the village to emphasize the need for water conservation through organization of public events, Kala Jathas, etc.
- Urge individual households to construct roof-top rainwater harvesting structures through IPC.
- Sensitize the community on rainwater harvesting measures in institutional buildings such as panchayat ghars, schools, public health centres; anganwadi centres (AWCs), etc.
- Support the Sarpanch in organizing Gram Sabhas on this issue.

4.2 Renovation of traditional and other water bodies/tanks

- Prepare an inventory of the existing structures and their status (check dams, trenches, farm ponds, etc.).
- Mobilize the community for renovation/ construction of such structures on a given date as per the programme calendar.
- Conduct outreach activities for individual households and motivate them to repair/renovate/ restore small household level water bodies.
- Make the community aware of the benefits of de-silting village water bodies, viz., wells/ponds/ lakes and mobilize the community for such activities on a given date

4.3 Watershed development

- Conduct attitude-changing campaigns to help people in rural areas overcome their reluctance in using greywater due to sociocultural norms, beliefs and practices.
- Conduct awareness building programmes to manage the demand of water and promote adoption of water conservation practices.
- Mobilize the community to promote construction/maintenance of groundwater recharge structures such as check dams, earthen bunds, percolation tanks, sunken pits, staggered trenches, etc.

4.4 Reuse and recharge structures

- Prepare an inventory of individual and community soak pits.
- Conduct IPC/community outreach to motivate households for construction/revival of soak pits.
- Mobilize the community and motivate them to construct/restore community soak pits.
- Conduct outreach activities to create community awareness regarding the maintenance of individual/community soak pits.

4.5 Intensive afforestation

- Encourage the community to plant more trees in the spirit of jan andolan.
- Conduct awareness building activities to motivate communities to plant native tree species that are drought-resistant and help in soil and moisture conservation.
- Organize/revive traditional ecological knowledge including knowledge on festivals that celebrate the rain, the forests, water etc.

17.2 Functions of swachhagrahi in creation of Swachh Gaon

A. ODF S

- Support the GP in determining the list of households that are defunct, need retrofitting and are not using toilets
- Organize IEC and IPC activities for defunct, in-need-of-retrofitting and unused toilets
- Support the GP in coordinating trainings for masons
- Support the GP in mobilizing resources for repairing and retrofitting of toilets

B. SLWM

- Support the GP in the preparation of a conveyance plan/ greywater management plan
- Support the GP in finalizing the of technological options for SLWM
- Generate awareness for SLWM at the household level

C. FSM and MWM

- Organize a pit emptying event at village level
- Support the GP in identifying service providers that empty septic tanks
- Support the GP installing incinerators at the school level
- Generate awareness about effective MWM

D. O&M of toilet facilities

- Support the GP in identifying service providers which can effectively operate and manage toilet facilities
- Support the GP in hiring services of individuals/agencies for O&M of toilet facilities

CHAPTER 18

DEVELOPING SWACHHAGRAHIS' SKILLS IN CONDUCTING IEC AND COMMUNITY MOBILIZATION ACTIVITIES

Key learning point

- IEC and community mobilization tools for mobilizing communities for Sujal and swachh Gaon

As discussed earlier, IEC and community mobilization are effective in the creation of a Sujal and Swachh Gaon. The swachhagrahi is a key stakeholder in the planning and implementation of Sujal and Swachh Gaon related IEC activities in the GP. However, swachhagrahis will need to acquire necessary skills for implementing these activities. This section presents the IEC and triggering tools which can be used by swachhagrahis to mobilize the community in the creation of a Sujal and Swachh Gaon.

18.1 Suggestive community mobilization and IEC activities for a Sujal and Swachh Gaon

A. Community mobilization activities

1. Discussion on water and sanitation in the Gram Sabha

Objective – to share the status of water and sanitation in the village and to finalize a plan of action for the creation of a Sujal and Swachh Gaon

Agenda

- Sharing the list of households that have defunct toilet or are not using toilets.
- Motivating families to use toilets regularly
- Discussing the interventions required for SLWM

The swachhagrahi will support the GP in preparing an additional list of families not having toilets and families not using toilet.

2. ODF anniversary

Objectives

- To celebrate ODF anniversary- the day on which the village attained the ODF status.
- To remind the village of its commitment towards ODF.

Process

- Organize village meetings
- Invite officials from the block/district
- Organize competitions, lectures on water and sanitation etc.

The swachhagrahi shall support the GP in the above-mentioned activities for the ODF Anniversary

3. Beautification of sites previously used for OD

Objective – To sensitize the people of the village to the importance of cleanliness by beautifying sites previously used for OD.

Process

- Identification of previous OP sites with the support of the Gram Sabha
- A workplan to be prepared for afforestation that can be performed through the MGNREGS
- OD sites to be cleaned and medicinal plants are to be planted in those sites
- Afforestation can also be performed through MGNREGS plan.

4. Organizing competitions

Objective – To create awareness and develop community ownership. E.g., Drawing competitions/ elocution competitions/ debate competitions to create awareness among children. Ward/ habitation wise cleanliness campaigns

B. IEC activities (support the following IEC activities)

1. Installation of hoardings in ODF villages

Hoardings mentioning the ODF status of the village and fines for defaulters should be installed by the GP with support from the swachhagrahi. This will prevent outsiders/visitors from defecating in the open and help in ensuring sustainability of ODF in the village. The Gram Sabha can decide on the number, size and location of such hoardings.

2. Sanitation register

A sanitation register can be maintained in the GP. Water and sanitation activities performed in the village should be recorded in the register and it is to be maintained by the VWSC or GP. New families in the village and construction of toilets in their homes, fines received from people not using toilets, punishment, etc. can also be noted down in this register. The swachhagrahi shall support the GP in maintaining the sanitation register.

3. Nirmal prabhat

Early morning vigilance and counselling is an effective way of ensuring ODF sustainability. The swachhagrahi with the support of the nigrani samiti ensures early morning participation of villagers in vigilance and counselling at a designated place. The group also makes door-to-door visit for counselling.

To organize nirmal prabhat, the swachhagrahi and nigrani samiti with the support of the panchayat can decide on the frequency of these meetings. Responsibility can be divided among panchayat members and involve SHGs. Village youths who can take lead in this process may be involved as well. Nirmal prabhat is effective if it is being organized in all the villages of a district at the same time.

4. Greywater dot chart

A greywater dot chart is a map of the village which is supposed to be maintained in a register by the Village Secretary with the help of swachhagrahis. The houses of families discharging greywater in the open are marked with red dots on the chart. This helps to identify households discharging greywater in the open. They also help in marking those households that need attitude-changing counselling through IPC. Similarly, households managing greywater through soak pits, etc. have to be marked with a green dot. This will create a sense of pride among these households and will build positive pressure on those households which do not fall under the green category. Yellow dots are used to indicate households that have greywater management facilities but are not maintaining those; and black dots are used to identify households that have inoperative and incomplete facilities constructed using wrong/ flawed technologies.

House S.No.	Name of head of the family	After 4 weeks				
		Date of first visit	After 1 week	After 2 weeks	After 3 weeks	After 4 weeks
1		●	●	●	●	●
2		●	●	●	●	●
3		●	●	●	●	●
4		●	●	●	●	●
5		●	●	●	●	●

5. Pit emptying exercise

Pit emptying exercises help in eradicating the myth that pit emptying is a tedious job. It also helps people understand that twin pit technology is a self-contained faecal sludge treatment system.

The swachhagrahi will support the GP in identifying pits (leach pits) which have become full and more than a year has elapsed after the installation of the pits.

6. Celebration of national and international days

Various days are celebrated at national and international level to generate awareness at various level on specific topic. The list of days related to water and sanitation is provided in Annexure 9. Gram panchayat can develop calendar on these event. On the occasion of these days, the GP with the support of swachhagrahis can organize water and sanitation activities such as cleaning with collective shramdaan (voluntary labour), rallies, formation of human chains, competitions, slogan writing, art group, announcements, etc. These will maintain a clean environment and help in sustainability.

7. Slogan writing/painting

Slogan writing activities based on sanitation in villages can be organized by GPs with support from swachhagrahis. This also includes conducting water and sanitation-related drawing/ painting activities in public places.

8. Door-to-door visits

Door-to-door visits can be made to disseminate information on hygiene habits by panchayat-level workers, self-help groups /youth groups. While making these visits, people should be sensitized to the importance of sanitation, its effect on health, etc.

9. Film screenings

Films on sanitation can be screened in gram panchayats with support from swachhagrahis to create awareness about sanitation among the villagers.

10. Hand washing demonstration

A practical demonstration of washing hands can be performed in front of children before their midday meals in schools. They should also be taught the importance of washing hands before having meals and after using toilets.

CHAPTER 19

ROLE OF FIELD TRAINERS IN FACILITATION AND ORGANIZATION OF TRAINING

Key learning point

Role of the field trainer in organizing and facilitating trainings

19.1 Background

Enabling and capacitating the lowest-level governance organizations, GPs, to sustain WASH achievements and move towards ***Sujal and Swachh*** Gaon is the main activity. This calls for building capacities of key stakeholders at district and state levels, who in turn could support GPs and communities in this endeavour. Thus, the Government has appointed four Field Trainers (FTs) from each district of the country to create competent and committed trainers and has organized a 5-day training programme. This training will enable new trainers to reach out to the official and non-official stakeholders of the GP. After the training it is expected that the FTs would organize and facilitate trainings for the Sarpanch, Village Secretaries and swachhagrahis.

19.2 Role of FTs in organizing and facilitation of trainings

1. Interaction with district officials

Immediately, after the completion of the 5- day training the FTs are expected to debrief the district officials over the 5-day training. S/he should share training action plans prepared during the training and request district officials to organize trainings for the Sarpanch, Village Secretaries and swachhagrahis, as per the plan.

2. Facilitation and organization of trainings

- Based on the training plan prepared during the ToT, the FTs, along with district officials will prepare detailed plans of trainings to be conducted by the FTs. This will include the dates for training sessions, venues, responsible FTs and other logistics. The FTs will also share the training resource material and list of training aids required for the training with the district officials.
- The FTs will then create, update and translate modules/manuals/training materials including PowerPoint presentations, handouts, practice exercises as per a district's needs and document the best practices.
- As per the plan, the FTs will conduct trainings for the Sarpanches, Village Secretaries and swachhagrahis. During the training facilitation, the FTs will ensure the following:-
  - Application of a wide variety of training methods and tools for mobilizing Sarpanches, Village Secretaries and swachhagrahis for creation of ***Sujal and Swachh*** Gaon
  - Liaison with relevant organizers, expert trainers, resource persons, participants and line departments.
  - Facilitate and organize exposure visits as per training needs.

3. Update information in trainee and trainers app

The FTs need to train the Sarpanches, Village Secretaries and swachhagrahis in updating the trainee app and themselves update the trainer's app regularly. For this, the FTs need to:-

- Review and practise the trainee app and demonstrate the same during the trainings for Sarpanches, Village Secretaries and swachhagrahis.
- Ensure that participants from each village fill up the village information sheet prior to the training. The format is attached as Annexure 10 of this resource material. This format will then be uploaded on the trainee app.
- On the last day of the training, the FTs will ensure that participants from each village fill up the action plan format for ***Sujal and Swachh*** Gaon. One copy of the format will be given to the participants for information. The format is attached as Annexure 10 of this resource material.
- Regular monitoring of whether the Sarpanches, Village Secretaries and swachhagrahis have updated the app in time
- Filling up the trainers' app regularly as per instructions

ANNEXURES

ANNEXURE 1

FORMAT FOR PREPARATION OF WATER BUDGET*

Table 1: Water availability chart for point sources:

Source no	Type of source	Location	Monsoon				Winter				Summer			
			Number of families using this source	How much water is collected (Litre / day/ family)	Total water availability from the source (Litre / day)	Total water availability in monsoon	Number of families using this source	How much water is collected (Litre / day / family)	Total water availability from the source (litre / day)	Total water availability in winter	Number of families using this source	How much water is collected (litre/ day/ family)	Total water availability from the source (Litre / day)	Total water availability in summer
			a	b	a X b = c	c X 120	a	b	a X b = c	c X 120	a	b	a X b = c	c X 120
1.														

Table 2: Water availability chart for pumping sources

Source no	Type of source	Location	Monsoon				Winter				Summer			
			Pump capacity (HP)	Pump discharge (lit/ hr.)	Pumping hours / day	Total water availability in monsoon	Pump capacity (HP)	Pump discharge (lit/ hr.)	Pumping hours / day	Total water availability in winter	Pump capacity (HP)	Pump discharge (lit/ hr.)	Pumping hours / day	Total water availability in summer
				a	b	a x b X 120		a	b	a x b X 120		a	b	a x b X 120
1.														

Calculating pump discharge

If people are unable to explain the hourly discharge of the pump then the planning team needs to calculate discharge at the pump delivery point at the storage tank using a 10 litre bucket.

$$\frac{10 \text{ X } 60}{\text{seconds taken to fill 10 litres bucket}} = \text{___ water discharge/min X 60 min = __ water discharge/hour}$$

Ensure that each member gets adequate time to discuss all the questions. In case of different views on the same question facilitate a discussion so that the group arrives at consensus.

Table 3: Water availability

Source no	Type of source	Location	Water availability in litre		
			Monsoon	Winter	Summer
1					
2					

Table 4: Season-wise water demand

Source no	Type of source	Location	Monsoon			Winter			Summer		
			Number of families	Total population	Total water demand	Number of families	Total population	Total water demand	Number of families	Total population	Total water demand
1											
2											
3											

Table 5: Drinking water budget

Source no	Type of source	Location	Monsoon			Winter			Summer		
			Water demand	Water availability	Gap	Water demand	Water availability	Gap	Water demand	Water availability	Gap
1											
2											

Table 6: Calculation of water consumption for industry or business

S.No	Type of Industry	Nos	Average daily requirement in litres	No of days/year of industry or business working	Total water requirement in litres
1.	Livestock				
2.	Hotel				
3.	Company				
4.	Factory				
5.	Others				
	Total				

Note: It is important to discuss details of hotel, company, factory and other such business activities prevailing in the village.

* Template is indicative and may be customized as per local need and context

ANNEXURE 2

FORMAT FOR PREPARATION OF WATER TARIFF BUDGET*

S. No	Details	Expenditure Details	Estimated Expenditure
A Operations expenditure			
1.	Water staff expenditure or The agency charges agreed as per agreement in the case of SHGs/ Cooperatives taking care of O&M	No. of staff × Monthly salary × 12 months	Rs. _____
2.	Solar maintenance Agency charges as per agreement or Electricity bill Units used × Pumping Hours× 0.**(rate) Note: This rate shall be updated every year by the respective district O&M Cell.	a. Annual fixed expenditure depending upon pump HP = Pump HP × (Rate/ HP/Month) × 12 months	Rs. _____
		b. Annual expenditure depending upon unit consumption = annual unit consumption × (Rate/Unit)	Rs. _____
		Sub total of (2) = sum of (a+b)	Rs. _____
3.	Chemicals: TCL powder Note:- Depending on daily water use, calculation based on 5g of TCL powder for 1000 litre water. Total expenditure of TCL should be calculated on the basis of regular dosing, usage in tank cleaning, water channels, WTP structures and other cleaning.	Annual expenditure on TCL = Total required quantity of powder × Rate/Kg	Rs. _____
4.	Water sample testing charges Sample conveyance charges	a. Bacteriological tests = No. of samples per year × rate/sample b. Chemical tests = No of sample/ year × rate/sample	Rs. _____
5.	Office expenditure (stationary, log books, miscellaneous)	Monthly expenditure × 12 months	Rs. _____
	Operation cost (1+2+3+4+5)	Total of A	Rs. _____
B. M&R expenditures			
6.	Routine M&R (for pipe line leakage repairing, valve repairing, pump motor repairing, tap repairing, colouring, etc. miscellaneous expenditure)	M&R = capital cost of water supply scheme × 1.5 %	Rs. _____

S. No	Details	Expenditure Details	Estimated Expenditure
7.	M&R expenditure for water sources Note:- According to DSR/ State Government approved rates. However, consider the rates as per actual rates in respective locations/ villages.	a. Hand pump M&R expenditure = No. of hand pumps × annul maintenance cost	Rs. _____
		b. Bore well M&R expenditure = No of bore wells × annul maintenance cost	Rs. _____
		c. Open well M&R expenditure = No of wells × annul maintenance cost	Rs. _____
		Subtotal (7) = sum of (a+ b+ c)	Rs. _____
8.	Reserve fund for any major repairs	Reserve fund = 20 per cent of the sum of (1 to 7)	Rs. _____
	Total M&R expenditures	Total of B = Sum of (6, 7 & 8)	Rs. _____
9.	Total operation and M&R expenditure	Total (A+B)	Rs. _____
C.	Income		Estimated Income
10.	The gram panchayat's contribution (through various sources- State specific O&M provisions, XIV FC, Own sources etc.)	To be decided by the gram panchayat	Rs, _____
11.	Contribution to be collected from users	Total expenditure (row 9) – gram panchayat contribution (row 10)	Rs. _____
12.	Assuming 90 per cent as billing efficiency And 80 per cent recovery of water tariff from the billed amount	Water tariff collection = (community contribution as per row 11) × (1/0.9) × (1/0.8)	Rs. _____
13.	Water tariff rate	Total water tariff collection as per row 12 / number of consumers	Rs. _____

* Template is indicative and may be customized as per local need and context

ANNEXURE 3

FORMAT FOR ASSESSMENT OF WATER SUPPLY FACILITIES*

General information of the village

Name of the village ..... Name of GP.....

Block ..... District.....

Population (2011 census)..... Male .....Female .....

Total No of HHs..... Total No of water sources.....

Hand Pumps ..... Wells ..... Bore wells.....

Checklist - Assessment of hand pumps

S. No.	Checklist	---------Hand pump no.		---------Hand pump no.	
		Status	Issues	Status	Issues
1.	Is the platform of hand pump in good condition?	Yes / No		Yes / No	
2.	Is there a proposed arrangement to dispose of wastewater around the hand pump?	Yes / No		Yes / No	
3.	Is there any problem in the functioning of the handle?	Yes / No		Yes / No	
4.	Is the water from the hand pump sufficient for the entire year?	Yes / No		Yes / No	
5.	Is there scope for water recharge?	Yes / No		Yes / No	
6.	Is the water of the hand pump potable?	Yes / No		Yes / No	
7.	Is the surrounding of the hand pump clean?	Yes / No		Yes / No	
8.	Has the chlorination of hand pump been done?	Yes / No		Yes / No	
9.	Is the source affected by arsenic?	Yes / N0		Yes / No	
10.	If yes, has an arsenic removal plant been installed?	Yes / No		Yes / No	
11.	Is the plant functional?	Yes / No		Yes / No	
12.	Is the filter media regularly replaced or washed?	Yes / No		Yes / No	

Note: All hand pumps will be assessed in the same format. If the private hand pumps at the house hold levels are more, then 5 hand pumps near the public hand pump should be assessed.

Issues identified.....

Suggested solutions.....

Checklist: Piped water supply system

No.	Checklist	Present	Issues	
I. Source (PWSS well)				
1	Is sufficient water available in the source	Yes / No		
2	Is the well-silted?	Yes / No		
3	Is there scope for source strengthening?	Yes / No		
4	Is the well / parapet in good condition?	Yes / No		
5	Is the water of the well in potable?	Yes / No		
6	Is the surrounding area of the source clean?	Yes / No		
II. Mini water supply scheme - bore well/ tube well (If electric pump is fixed on a bore well)				
7	Is the water of the bore well sufficient throughout the year?	Yes / No		
8	Is there a scope for strengthening of the bore well?	Yes / No		
9	Is the surrounding area of the source clean?	Yes / No		
10	Is the water of the bore well is potable?	Yes / No		
11	Does the bore well discharge water according to its capacity?	Yes / No		
12	Is the panel box of the bore well in good condition?	Yes / No		
III. Pumping machinery- PWSS				
13	Do the pump lift water as per its capacity?	Yes / No		
14	Is a stand-by pump provided? Is the pumping logbook up-to-date?	Yes / No Yes / No		
15	Is the machinery shaking and making noise when operating?	Yes / No		
16	Does the pump lift water as per its capacity?	Yes / No		

No.	Checklist	Present	Issues	
IV. Pump house				
17	Is the pump house in a good condition?	Yes / No		
18	Is the electrification in good condition?	Yes / No		
19	Is the earthling in good working order?	Yes / No		
V. Rising main (from pump to storage tank)				
20	Is there a leakage in the rising main?	Yes / No		
21	Are there any tap connections from the rising mains?	Yes / No		
22	Are the valves on the rising main functioning?	Yes / No		
VI. Storage tank				
23	Are there leakages in the storage tank?	Yes / No		
24	Is there a proper lid?	Yes / No		
25	Is there a system of ladder inside and outside of the storage tank and is it in good condition?	Yes / No		
26	Are there leakages in the valves near storage tank?	Yes / No		
27	Is there a fencing around storage tank?	Yes / No		
28	Is the storage tank cleaned at least once a month?	Yes / No		
VII. Community purification plant (arsenic removal)				
29	Is the purification plant functional?	Yes / No		
30	Has the filter media been replaced or washed?	Yes / No	How frequently .....?	
31	Does the VWSC maintain the plant in its breakdown?	Yes / No		
VIII. Distribution network				
32	Is there a proper zoning system at the village level for equal distribution of water?	Yes / No		
33	Are there leakages in the distribution line and in the valves fitted to distribution line?	Yes / No		
34	Are there taps fixed to stand posts and private connections?	Yes / No		
XI Financial management				
35	Has the annual water supply budget been prepared?	Yes / No		
36	Was 100 per cent of the water tax collected last year?	Yes / No		
37	Is the current water tax rate adequate?	Yes / No		
Ix	Institutional management			

No.	Checklist	Present	Issues
38	Has the VWSC been formed in the village?	Yes / No	
39	Has the training of VWSC been organized?	Yes / No	
40	Has a water person been appointed in the village?	Yes / No	
41	Has the training on water quality and O&M been organized for the water person?	Yes / No	
42	Is the grievance redressal system in place in village?	Yes / No	
43	Is an O&M kit for the water person available in the village?	Yes / No	

Issues identified.....

Suggested solutions.....

* Template is indicative and may be customized as per local need and context

ANNEXURE 4

FORMAT FOR WATER QUALITY ASSESSMENT*

General information of the village

Name of the village ..... Name of GP.....

Block ..... District.....

Population (2011 census)..... Male .....Female .....

Total No of HHs..... Total No of water sources.....

Hand Pumps ..... Wells ..... Bore wells.....

Checklist	Status	Issues
I) Water quality monitoring		
Is chlorination of water done regularly?	Yes / No	
Is the record of chlorination maintained?		
Is TCL powder properly stored in an air tight container?	Yes / No	
Are OT tests conducted and findings recorded regularly?	Yes / No	
Is mother solution distributed to families as per requirement?	Yes / No	
Is alum used for drinking water at the household level during rainy season?	Yes / No	
II) Water testing		
1) Has the priority for water sources been decided?	Yes / No	
2) Is water regularly tested for chemical and biological contamination?	Yes / No	
3) Is water quality test report available in the GP office?	Yes / No	
4) Have proper steps been taken to prevent water pollution?	Yes / No	
A. Cleanliness around water source		
1) Are the surroundings of the water source clean?	Yes / No	
2) Is the waste water stagnated near the source?	Yes / No	
3) Are there individual/community toilets at distance of 10 m from the water source? If not, then have any steps been taken to address it?	Yes / No	

Checklist	Status	Issues
4) Is the garbage stored near the water source?	Yes / No	
5) Are clothes, utensils and animals washed around the water source?	Yes / No	

Note: If the issues persist in the village then note them separately in the column provided in the checklist for issues

1. Issues.....

2. Solutions.....

* Template is indicative and may be customized as per local need and context

ANNEXURE 5

FORMAT FOR HOUSEHOLD LEVEL ASSESSMENT OF WATER AND ODF PLUS*

Household level sanitation survey proforma (A)

Sn	Head of family	Caste/ Category	No. of family members	Availability of toilet			If yes, type of toilet			Toilet usage (members)			Soak pit for toilet with soakpit		Filled		Liquid waste management			
				Usable	Defunct	No	1 pit	2 pit	Septic	All	Few	No body	Yes	No	Yes	No	Kitchen garden	Soak pit	Open drain	Open
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Total																			

Household level sanitation survey proforma (B)

Solid waste management			Management of drinking water								Water for y=use		Use of soap for hand washing			General sanitation		
Compost pit nearby HH	Compost pit in own land	Compost pit in public land	Storage		Handling		Usage		Filtration		Yes	No	All member	Few member	Nobody	Best	Good	Bad
			Yes	No	Yes	No	Yes	No	Yes	No								
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

* Template is indicative and may be customized as per local need and context

ANNEXURE 6

FORMAT FOR INSTITUTIONAL LEVEL ASSESSMENT OF WATER AND ODF PLUS*

6.1 Institutional (school) sanitation survey proforma (A)

Sn.	School name	Type of school (Pri/Sec)	No. of students			Availability of toilet (numbers)									Drinking water facility		
			Boys	Girls	Total	Boys			Girls			Handicapped			In premises	Outside premises	No facility
						Usable	Defunct	Additional required	Usable	Defunct	Additional required	Usable	Defunct	Additional required			
	Total																

Sn.	School name	Type of school (Pri/Sec)	No. of students			Availability of urinals (numbers)									Drinking water facility		
			Boys	Girls	Total	Boys			Girls			Handicapped			In premises	Outside premises	No facility
						Usable	Defunct	Additional required	Usable	Defunct	Additional required	Usable	Defunct	Additional required			
	Total																

6.2 Institutional (school) sanitation survey proforma (B)

Sn	School name	Solid waste management			Liquid waste management				Place for hand washing			Menstrual health management		
		Compost pit in area	Public compost pit	No facility	Soak pit	Kitchen garden	Publicly managed	No facility	No. of taps	Water available	Requirement of new taps	Sanitary pads	Changing room	Disposal facility
	Total													

6.3 Institutional (anganwadi) sanitation survey proforma

Sn	Name of anganwadi	Number of students			Toilet			Baby friendly		Water for drinking		Hand wash facility with water			Liquid waste management facility		Solid waste management facility	
		Boys	Girls	Total	Usable	Defunct	No	Yes	No	Yes	No	Defunct	Yes	No	Yes	No	Yes	No
	Total																	

6.4 Institutional (health centre) sanitation survey proforma

Sn	Name of health centre	Toilet Facility			Hand wash facility with water		Drinking water facility		Liquid waste management		Solid waste management		Biomedical waste disposal facility		Menstrual health management facility	
		Usable	Defunct	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	Total															

6.5 Institutional (GP office and other institutions) Sanitation survey proforma

Sn	Name of the institution	Toilet			Drinking water facility		Hand washing facility with water			Liquid waste management		Solid waste management	
		Usable	Defunct	No facility	Yes	No	Defunct	No	In premises	Yes	No	Yes	No
	Total												

* Template is indicative and may be customized as per local need and context

FORMAT FOR SANITATION WALK*

Greywater management

Name of village: ..... Name of GP: .....

No. of individual soak pits ..... No. of kitchen gardens ..... Length of constructed drainage in the village (metres).....

No	Type of drainages	GPS no.	Open drainages	GPS no.	Underground drainages
	Total length		.....		.....
	Are drainages available for all households? (Number and percentage)		Number: ..... Percentage:		Number: ..... Percentage: .....
	Total repairs needed (meters)	.....			
	In case of repairs, location and proposed length in meters		..... to		..... to .....
			..... to		..... to .....
			..... to		..... to .....
	Total silted drainages (meters)		..... to		..... to .....
	Location and proposed length in meters		..... to		..... to .....
			..... to		..... to .....
	Details of required drainages		..... to		..... to .....
			..... to		..... to .....

No	Type of drainages	GPS no.	Open drainages	GPS no.	Underground drainages
	Total length		.....		.....
	Are drainages available for all households? (Number and percentage)		Number: ..... Percentage:		Number: ..... Percentage: .....
	Total repairs needed (meters)	.....			
	Are individual soak pits required for greywater management?			Yes/ No	If yes, make a separate list of families
	Are individual kitchen gardens required for greywater management?			Yes/ No	If yes, make a separate list of families
	Is end treatment required for greywater management?			Yes/ No	If yes, make a separate list with location

2. Solid resource management:

No.	Component	Observation points	Issues	Measures
1. Solid resource management at household level				
A	Segregation method	Approximate quantity of dry-----kg and wet garbage------kg. Method of garbage segregation--------		
B	End treatment of wet garbage at the household level	Number of families---------- Technical appropriateness----------		
C	Option for dry garbage management	Number of families selling garbage to kabadiwala ---------- Number of families dumping garbage in public places----------		
2. Solid resource management at community level				
A	Segregation/collection and transportation of waste	Total number of families using dustbins---------- Method of garbage collection---------- Method of waste transportation----------		
B	Solid waste dumping sites	Number---------- Present use---------- ----------		
C	End treatment	Present system		

* Template is indicative and may be customized as per local need and context

ANNEXURE 8

LIST OF IMPORTANT NATIONAL AND INTERNATIONAL DAYS*

Date	Event	Details
24 January	National Girl Child Day	To promote girls' position in the society
26 January	Republic Day	Honours the day on which the Constitution of India came into effect replacing the government of India Act as the governing document of India
2 February	World Wetlands Day	For disaster risk reduction
8 March	International Women's Day	To commemorate the Women's Rights Movement
22 March	World Water Day	Focuses on the importance of universal access to clean water, sanitation and hygiene facilities
7 April	World Health Day	To mark the anniversary of the foundation of WHO
22 April	World Earth Day	To support environmental protection
24 April	National Panchayati Raj Day	Marks the ratification of a Constitutional Act
1 May	International Labour Day	Celebration of labourers and working class
14 May (2nd Sunday)	Mothers' Day	To celebrate mothers
15 May	International Families Day	To raise awareness of role of families
5 June	World Environment Day	Encouraging worldwide awareness and action for protection of environment
8 June	World Ocean Day	Celebrating our ocean
3 July	International Plastic-Free Day	Dedicated to raising awareness about issues caused by the use of plastic
15 August	Independence Day of India	Celebrating Indian Independence
24 September	World Rivers Day	Global celebration of world's water ways
26 September	World Environmental Health Day	To draw public attention to environmental problems
2 October	Mahatma Gandhi Jayanti	To commemorate the birth of Mahatma Gandhi
5 October	World Teachers' Day	To commemorate teacher organizations worldwide
11 October	International Girl Child Day	To increase awareness about issues faced by girls all over the world
15 October	International Day of Rural Women	To recognize the critical role and contribution of rural women, including indigenous women, in enhancing agricultural and rural development, improving food security, and eradicating rural poverty
3 December	International Day for Persons with Disabilities	To promote understanding of disability issues and mobilize support for the dignity, rights and wellbeing of persons with disabilities
5 December	International Volunteer Day	To pay special tribute to people participating in making a difference

* Template is indicative and may be customized as per local need and context

ANNEXURE 9

GRAM PANCHAYAT INFORMATION SHEET*

Section 1: General information:

1.	State:----------	District:----------	Block:----------		GP: --------	No. of Villages/ Habitations:----
2.	Current Population:---------- -----	No. of Households:----------				No. of Livestock:----------

Section 2: Information about rural water supply facilities :

1.	Is a piped water supply (PWS) scheme available in the GP?	Yes ☐ No ☐
2.	Are all households in the GP covered by PWS?	Yes ☐ No ☐ If no, no. of households not covered:....
3.	What is the source of PWS?	Tube well ☐ Open Well ☐ Surface Water ☐ Other ☐
4.	Is the source of PWS perennial?	Yes ☐ No ☐
5.	Number of other drinking water sources	Handpump:...Open well :...Tube well:... Spring /Surface Water:...
6.	Is a tanker required in summer?	Yes ☐ No ☐ If yes, then for how many HHs----------
7.	Who is responsible for daily operations of PWS in the GP?	GP/ VWSC ☐ Department ☐ Contractor ☐ External service provider ☐
8.	Does the GP levy water tax?	Yes ☐ No ☐ If yes, annual recovery (per cent):.....
9.	Is the water tax collected sufficient to maintain water supply facilities?	Yes ☐ No ☐
10.	Has a water person been appointed by the GP?	Yes ☐ No ☐
11.	Is the PWS water chlorinated every day?	Yes ☐ No ☐ If yes, whether chlorination process is done manually or automated
12.	Is OT test done daily?	Yes ☐ No ☐ If yes, is it recorded? Yes ☐ No ☐
13.	Is bacteriological testing of drinking water sources done regularly?	Yes ☐ No ☐ If yes, whether the reports are available? Yes ☐ No ☐
14.	Is chemical testing of drinking water sources done regularly?	Yes ☐ No ☐ If yes, whether the reports are available? Yes ☐ No ☐
15.	Is VWSC functional?	Yes ☐ No ☐ If yes, then are VWSC members trained? Yes ☐ No ☐

Section 3: Information about sanitation:

1.	Type of toilets in numbers	Single pit:..... Twin pit :..... Septic tanks:..... others:.....
2.	Do all households use toilets regularly?	Yes: ☐ No: ☐ If no, no. of HHs not using toilets:...
3.	If some households do not use, what are the reasons for that? (Provide numbers of households)	Non availability:..... Dysfunctional:..... Mind set:.....
4.	How is greywater managed at the household level in the GP? (mention no. of HHs)	Kitchen gardens:.....Soak pits:.....Other:..... Open discharge:..... Connected to gutter:.....
5.	Is there a provision for end treatment of liquid waste management facility in the GP?	Yes ☐ No ☐ If yes, then names of technologies used .....
6.	Do all households segregate wet and dry garbage?	Yes ☐ No ☐ If no, no. of families .....
7.	Is there a provision for community level end treatment of bio- waste?	Yes ☐ No ☐ If yes, then name of the technology used .....
8.	Is there a provision for management of inorganic waste (Plastic waste , menstrual waste)	Yes No
9.	Is a system for emptying of pit latrines available in the GP?	Yes ☐ No ☐
10.	Is a system for desludging septic tank type latrines available in the GP?	Yes ☐ No ☐
11.	Do all anganwadis in the GP have toilet facilities?	Yes ☐ No ☐
12.	Do all schools in the GP have separate toilet facilities for boys and girls?	Yes ☐ No ☐

Section 4: Institutional arrangements

1.	Have all the GP members received water sanitation related training?	Yes ☐ No ☐ If yes, mention the year of training:.....
2.	Is there a source of funding for water and sanitation works in the GP?	GP owned funds ☐ 14th FC ☐ CSR ☐ Public contribution ☐
3.	Have provisions for water and sanitation works been made under the GPDP?	Yes ☐ No ☐
4.	Have the swachhagrahis been selected?	Yes: No: If yes, then no. of swachhagrahis:...
5.	Do all swachhagrahis know their roles and responsibilities in the ODF Plus phase?	Yes ☐ No ☐
6.	Has the GP prepared a community-led action plan for ODF Plus?	Yes ☐ No ☐
7.	Does the GP have a grievance redressal system for water supply?	Yes ☐ No ☐

Note: This format can be translated in local languages and contextualized by the states

* Template is indicative and may be customized as per local need and context

ANNEXURE 10

INDICATIVE FORMAT OF ACTION PLAN*

***Please tick (√) in remark/status column if the proposed activity is already complete.**

Village action plan for Sujal and Swachh Gaon

1.	Details of Gram Panchayat	Name: District:	Block: State :
2.	Details of Sarpanch	Name:	Contact No. (WhatsApp No.):
3.	Details of Village Secretary	Name:	Contact No. (WhatsApp No.):
4.	Details of Swachhagrahi	Name: Name:	Contact No. (WhatsApp No.) : Contact No. (WhatsApp No.)

1. Action plan for Sujal Gaon

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
A. Preparatory activities						
A1	Formation /strengthening of VWSC, Nigrani Samiti & appointment of swachhagrahi					
B. Source sustainability						
B1.	Finalization of rain water harvesting and recharge interventions for sustainability of drinking water sources with funding sources					
C. Provision of household connections						
C1	Application with necessary resolutions for selection under JJM					
C2	Preparation of DPR for PWS with household connection for uncovered households					
C3	Implementation of proposed DPR for new PWS with household connections					

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
D. Operation and maintenance of water supply facilities						
D1.	Preparation of O&M budget of the GP and define drinking water tariff					
D2.	Identify and engage individuals and agencies for regular maintenance, repairs and servicing of components as per issues emerged during planning process					
E. Water quality monitoring and surveillance						
E1.	Finalize actions and responsibilities for: ▸ Source protection ▸ Disinfection of water ▸ Water quality testing ▸ Record keeping					
E2.	IEC activity for awareness generation about water quality and safe practices					

Note: Involve engineer from bock/sub division level to finalize action plan for Sujal Gaon

2. Action plan for Swachh Gaon

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
A. ODF S						
A1.	Household level toilets ▸ Repairs of dysfunctional toilets ▸ Retrofitting of toilets ▸ IPC with families not using toilets ▸ Identify and engage individuals and institutions for O&M services					
A2.	Institutional level toilets ▸ Repairs of dysfunctional toilets ▸ Identify and engage individuals and institutions for O&M services ▸ IEC for use of toilets					

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
A3.	Make provision for new toilets or adapt existing toilets for easy access by Divyang at household and community level					
B. Solid and liquid waste management						
B1.	Preparation of conveyance and processing plan for solid waste management including technology ▸ Compost pit units ▸ Biogas units (Gobardhan) ▸ Vermin compost pit ▸ Identification of vendors for plastic waste management					
	Preparation of plan (DPR) for greywater management including technology ▸ Soak pits ▸ DEWATS ▸ Stabilization pond ▸ Root zone bed technology Any other suitable technology					
	Identification of technology and service provider for Faecal sludge management and its implementation					

3. Action plan for IEC & capacity strengthening for Sujal and Swachh Gaon

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
C1. IEC for Sujal and Swachh Gaon						
	▸ Finalization of IEC messages/ tools/ target audience					
	▸ Finalization of communication champions					
	▸ Resource mobilization and implementation of IEC activities ▸ Organization of massive IEC campaign (1+4)- (i) Wall paintings for Toilet use by all, toilet usage to keep diseases away, safe disposal of child faeces, compost pit; (ii) display board at entrance of village					

No.	Activity	Implementation responsibility	Duration	Resources required	Monitoring responsibility	Remark/ status *
	▸ IPC for household water supply connection, water tariff collection, retrofitting and use of toilets					
C2. Capacity strengthening for Sujal and Swachh Gaon						
	Coordinate for capacity strengthening of village stakeholders- ▸ Training of communication champions on implementation of IEC/ IPC tools ▸ Training of VWSC members on roles and responsibilities regarding Sujal and Swachh Gaon ▸ Training of barefoot technicians / water persons for O&M of water supply facilities and water quality ▸ Training of swachhagrahis on roles and responsibilities regarding Sujal and Swachh Gaon					

Note: The village level IEC activities will align with the district IEC plan

2019

Developed by UNICEF in consultation with DDWS, Government of India

सत्यमेव जयते

DEPARTMENT OF DRINKING WATER AND SANITATION
MINISTRY OF JAL SHAKTI

स्वच्छ भारत
एक कदम स्वच्छता की ओर