Lifewater

School Operation and Maintenance Training

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Our Mission

We are Christians providing access to safe water, and improved sanitation and hygiene, one village at a time.

Our Vision

Safe water for every child. A healthy home for every family. The love of Christ for all.

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School Operations and Maintenance Training

Revised March 2022

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Introduction

What This Guidebook Is

This manual is intended to teach schools about the necessary operation and maintenance (O&M) of each type of WASH infrastructure that they have at their school. This is important because without proper operation and maintenance, the infrastructure quickly breaks down, which can place the school and students back in the same situation they had before.

If School O&M lessons are successful, school staff will attend to the need of their water, sanitation, and hygiene infrastructure on a daily, weekly, monthly, and yearly basis. Students and teachers will not experience regular breakdowns or failures of equipment and have consistent access to equipment that will allow them to adopt healthy WASH practices.

Who This Guidebook Is For

This manual is designed for groups, organizations, or government actors who will be training school administrators in how to make the water, sanitation, and hygiene facilities at their school function properly for the intended lifecycle.

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Instructions and Lesson Format

Instructions for Use

Before the training:

- Prior to the training, find out costs for draining school pit latrine blocks. There is not a tariff sheet for draining latrines since these costs vary so much. Also, discuss if district administration is responsible or able to help with any maintenance costs.
- Select the specific types of hardware that are found (or will be constructed) at that school. Make copies of each section covering the types of hardware that the school has or will have.

During the training:

- Ask about the hardware that they currently have at the school.
- Using a flipchart, ask what is good about the hardware and what has been challenging. Ask if there are possible solutions. The goal is to understand what they see as the challenges they currently have and also begin to think of solutions.
- For each type of hardware the school has, do the following:
    - Show the picture of the type of hardware and discuss how the hardware works and the key parts of the hardware. Ask the group if they have any questions about how it works, and make sure that everyone understands clearly.
    - Ask if they can imagine any problems and what could be the cause and solution of each problem. Referring to the table of "Common Operation and Maintenance Problems" for the specific type of hardware, make sure each possible problem is discussed.
    - Using the "Maintenance Plan" tables, have the group create a plan for the regular maintenance, indicating who will do each activity. There are lines added to each section of this in case the team has additional tasks they would like to add based on their discussion. (Please note that there is one "Maintenance Plan" for latrines/urinal/changing room/handwashing station as these systems are typically connected. Each type of water point has a separate "Maintenance Plan".)
    - Have the group create a plan to teach others about Operation and Maintenance challenges and solutions, as well as to implement their "Maintenance Plan".
- Plan for maintenance costs. Following creation of the maintenance plan, discuss the need for funds to cover regular maintenance. Work together to create a plan for these costs.
    - In the training, discuss who is responsible for the regular maintenance costs (e.g., school administration, PTA, district government, etc.).

Structure

The following describes the sections included in each lesson.

Preparation and Materials Needed: This will explain any materials that need to be gathered or prepared before the start of the lesson. It is recommended to review these prior to the training so any necessary materials can be purchased, printed, prepared, and brought to the training.

Expected Time: This is the amount of time you should plan for the lesson to be completed.

Key Message(s): These are the main messages the lesson, activities, and discussion intend to communicate.

Review (if applicable): This is the part of the lesson where participants are asked to share the key messages from the previous lesson.

Discussion: These questions are intended to help participants engage around the topic of the lesson. They are a way to reflect upon any learning that may have taken place. These questions are a guide and can be supplemented with topical questions from the facilitator.

Group Activity (if applicable): Most lessons involve some type of group or interactive activity. Instructions for the activity are included within the lessons.

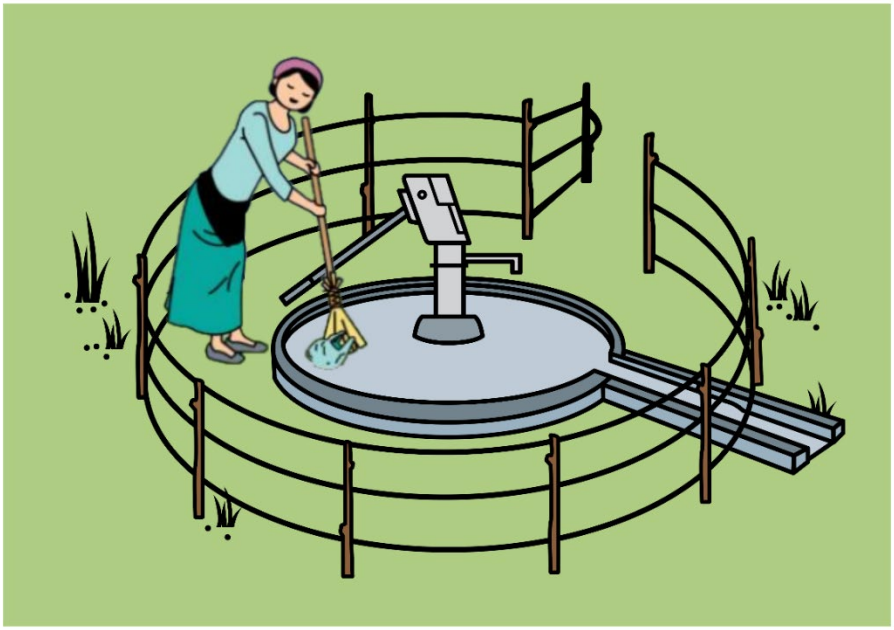
Take-Home Messages: Each lesson will end with a set of "take-home" messages. These are the key points from the lesson to review with the group.

Any text that is noted in italics should be read and communicated to the participants.

Resources

This manual is strongly based on the information and outline from *Hand Book for Operation and Maintenance of Water, Sanitation and Hygiene Facilities in Schools in Uganda, 2009.* All color drawings within this manual are from this handbook. The tables of "Common Operation and Maintenance Problems and Solutions" are directly adapted from this handbook. Lifewater has great appreciation to the Government of Uganda for creating a helpful resource for schools

Lesson 1: **Wells**



Key Messages

Wells are made up of various parts that need daily, monthly, and seasonal maintenance to keep it running properly. Common problems with wells include broken parts of the hand pump, loose nuts and bolts, rusty nuts and bolts, cracked platforms, clogged drainage channels, lack of a soak pit, and lack of a fence.

Overview

A well can either be hand dug or drilled by a machine.

A hand pump draws groundwater from the aquifer. It should be securely fitted to the apron/platform so the base does not move.

An apron (or platform) surrounds the well.

A drainage channel guides spilled water away from the hand pump to a soakaway pit so it can soak into the ground away from the well.

A soakaway pit is a defined area with coarse materials like large rocks to keep spilled water away from the well.

A fence is made to surround either the well or the school to provide a barrier to keep animals away from the well so that they do not defecate on the well or cause damage to it.

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Common Operation and Maintenance Problems for Wells

Common Problems	Causes	Solutions
1. Broken parts of the hand pump (e.g., chain, handle)	• Worn out parts • Lack of greasing • Lack of spare parts • Lack of preventive maintenance	• Repair or replace broken parts • Proper and gentle handling when drawing the water • Regular maintenance
2. Loose nuts and bolts	• Lack of regular preventive maintenance	• Tighten bolts and nuts
3. Rusty nuts and bolts	• Lack of regular preventive maintenance	• Regular greasing and maintenance • Use good quality materials as an intervention
4. Cracked platform/ Broken drainage channel	• Stray animals at the source • Poor workmanship and construction materials	• Do not allow animals near the water source • Orderly use of the facility to avoid struggling
5. Clogged drainage channel	• Lack of regular cleaning of the channel • Throwing rubbish in drainage channel	• Clean the drainage channel regularly and remove all debris • Do not laundry/bath near the water source
6. Lack of a soak pit or broken soak pit	• Negligence • Lack of knowledge on importance of soak pits	• Provide soak pit or plant flowers • Create awareness on use of soak pit

7. Lack of fence around source or broken fence	• Lack of awareness about importance of a fence around the source • Lack of budget or operation and maintenance plan • Children playing at source / removing fence	• Provide/mend the fence around source • Set an operation and maintenance plan • Children should avoid playing at the source that may result in damaging of the facility

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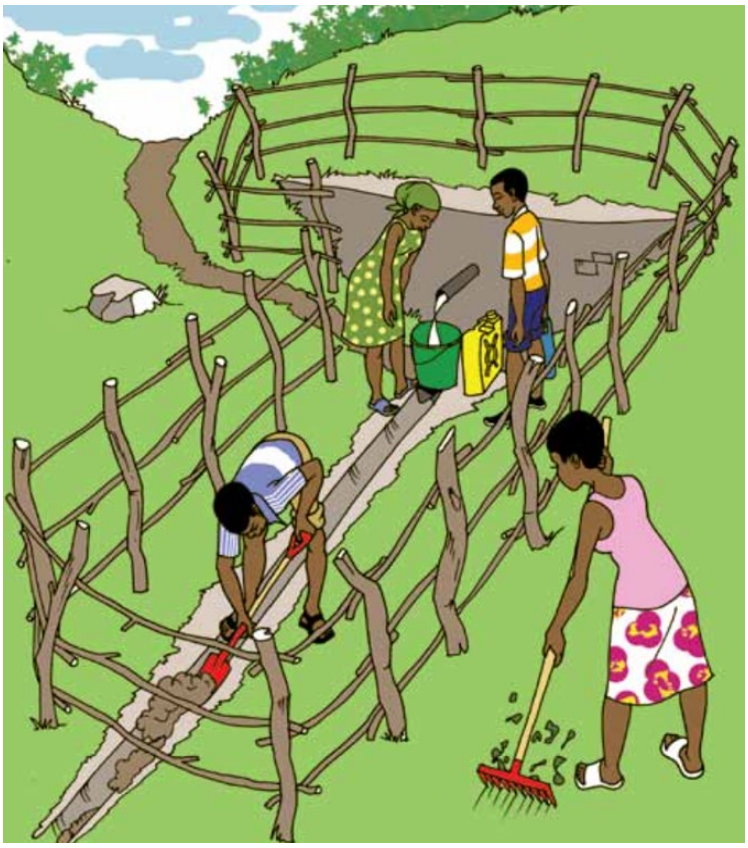
Maintenance Plan for Wells

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for cracking in apron and drainage channel	If surface crack(s) present, repair using cement mortar	
		If major crack(s) present, call technician to repair	
	Check for stagnant water around the pump, apron, and soak pit	Fill in any low spots around the apron with soil to prevent pooling and clean out the soak pit if necessary	
	Check for rubbish, overgrown vegetation, and OD near the water point	Clean up rubbish and OD and trim vegetation	
	Check the drainage channel for rubbish or silting (filling in by soil)	Remove any rubbish and/or silt from the drainage channel	
	Check if pump produces water	Call a technician if the pump produces little or no water	
	Check fence for any breakages or weakness	Fix the fence so animals do not have access	
Monthly	Standard maintenance if pump is India Mark II or III	Grease chain	
	Check bolts/nuts to see if loose	Tighten bolts/nuts as necessary	
	Check if the pump stand is shaky	Call a technician if pump stand is loose	
	Check if handle is moving sideways	Call a technician if the handle moves sideways	
	Check if water is leaking around base or tank	Call a technician if any leakage is present	
	Check how many pump stokes are required for water to begin flowing for the first person to arrive at the pump in the morning	Call a technician if more than 10 pumps are required (the seals are leaking)	

	Check how long it takes to fill a 20-liter jerry can with pumped water	If flow is much slower than previous month or if pump takes more than 2 minutes 30 seconds to fill jerry can, call a technician	
	Observe if there is a change in taste / color / cloudiness / smell from the previous month	Call a technician and ask for a water quality test	
	Check for potential contamination sources within 30 meters surrounding well	Work with landowner/animal owner to eliminate source(s) of contamination	
Seasonal	Check for accessibility issues (e.g. locked pump, landowner issues, crumbling stairs, etc.)	Negotiate with Water Committee, landowners, and users to resolve any access issues. Call a technician to repair any broken infrastructure affecting access.	
	Standard maintenance for hand-dug wells (twice per year)	Call a technician to disinfect well and check for/remove silt	

Lesson 2: **Protected Springs**



Key Messages

Protected springs are natural underground water sources which have been protected from contamination. Some ways to protect a protected spring is to surround the backfill area with a fence and keep water from pooling at the spring through a drainage channel or soakaway pit.

Lesson Content

Protected springs are natural flowing underground water sources which have been protected from contamination through proper construction and are fitted with water delivery pipe. Sometimes, they also have night storage tanks or pipelines leading to tap stands to delivery spring water further away from the source.

Spring backfill area is directly above the spring, and this area should be protected by a fence to protect from erosion and contamination.

A night storage tank is sometimes created so that water can be collected from the spring all night long so that it is ready for collection during the day. This is helpful when the spring flow is low or the population using the spring is high.

An overflow pipe allows direct overflow from the spring or from the night storage tank so that pressure does not build up behind the spring.

A tap stand is sometimes created after a pipeline to enable water gathering when the spring is a long distance from a school.

A drainage channel guides spilled water away from the spring to a drainage area or soakaway pit so that it does not pool at the spring.

A fence is constructed around the spring to protect it from animals or farming, which could damage the spring. Sometimes a fence is also constructed around night storage tanks or tap stands to protect them from animals or misuse.

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Common Operation and Maintenance Problems, Causes, and Solutions for Protected Springs

Common Problems	Causes	Solutions
1. Worn out or broken fencing materials	• Watering animals at the source • Stray animals at the source • Poor workmanship • Wear and tear	• Regularly repair/maintain the fence • Proper construction • Prevent animals from the water source
2. Cracks or breaks in spring protection or night storage tank	• Poor quality construction or materials • Not repairing soon after problem is identified (problem gets worse) • Watering animals at the source, letting them walk on spring or night storage tank	• Repair any cracks on any part of the spring • Use proper construction materials & methods • Keep animals away and do not give them water at the spring
3. Broken taps on night storage tank or tap stand	• Users not being cautious when using a tap • Poor quality materials	• Replace tap • Use high quality materials • Teach proper use of taps
4. Clogged overflow pipe	• Rocks or other debris put in overflow pipe • Lack of understanding of the purpose	• Remove rocks and debris • Teach about importance of overflow pipe
5. Uncleared drainage	• No plan to remove debris from drainage • Poor management by the school administration / PTA	• Clear the drainage area • Create a maintenance plan and follow-up • Select and train water user committees and care takers
6. Collection point flooded with water	• Clogged drainage channel • Watering animals at the source • Poor workmanship	• Clear the drainage area • Clean around the source • Proper construction with good drainage channels
7. Spring backfill area is eroding or has open defecation	• Lack of understanding of importance • No fence around the area, so people and animals walk through it (and/or defecate there) • No grass planted to prevent erosion	• Clear the area of any open defecation or other rubbish • Create fence around the area • Plant grass around the catchment area • Create a maintenance plan and follow-up
8. Lack of fence or broken fence	• Lack of awareness about importance of a fence • Lack of budget or operation and maintenance plan • Children playing at source / removing fence	• Provide/mend the fence around spring catchment area and other fence areas • Set an operation and maintenance plan • Children should avoid playing on the fence that may result in damage

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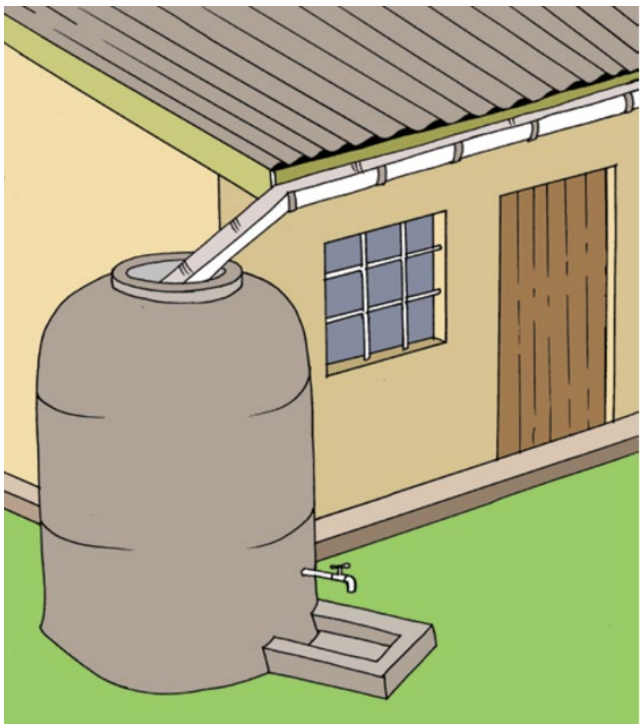
Maintenance Plan for Protected Spring

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for cracking	If surface crack(s) present, repair using cement mortar	
		If major crack(s) present, call technician to repair	
	Check for stagnant water around the spring outlet	Fill in any low spots with soil to prevent pooling	
	Check for rubbish, overgrown vegetation, and OD near the water point	Clean up rubbish and OD, and trim vegetation	
	Check the drain for rubbish or silting (filling in by soil)	Clean up any rubbish in the drain & remove silt from drainage channel	
	Check for blockages in the outlet and overflow pipes	Remove any blockages	
	Check all fittings for leakage	Tighten or replace fittings as needed to stop leakage	
	Check fence for any breakages or weakness	Fix the fence so animals do not have access	
Monthly	Check for potential contamination sources within 100 meters uphill from the spring	Work with landowner/animal owner to remove source(s) of contamination	
	Check for breaks in the fence that allow livestock to enter	Repair any broken fencing	
	Check the cut-off drain for debris or erosion	Remove any debris and repair as needed the cut-off drain	
	Check for changes in the taste, color, and/or odor of the water	Call a technician if there is major change (possible contamination)	
	Check for wet spots on the ground above the spring and in fenced area (protection area)	Call a technician if there are wet spots (possible leakage)	

	Check for unexpected changes in the flow	Call a technician if there is major change in flow	
Seasonal	Check for accessibility issues (e.g. locked pump, landowner issues, crumbling stairs, etc.)	Negotiate with Water Committee, landowners, and users to resolve any access issues. Call a technician to repair any broken infrastructure affecting access.	

Lesson 3: Rainwater Harvesting System



Key Messages

Rainwater harvesting systems are used to catch and safely store rainwater with a catchment area, a gutter, and a tank, which all requires regular maintenance. Important parts of the rainwater harvesting system are the filter box, first flush systems, water storage tanks, and soakaway pits.

Lesson Content

Rainwater harvesting systems use the roof buildings (school buildings or latrine blocks) as the catchment area and uses tanks to store the water. A basic rainwater harvesting system includes a catchment area, gutter, and a tank.

Catchment area is the roof surface, where the rain falls and runs to gutters.

Gutters gather water from the roof and direct it to the storage tank.

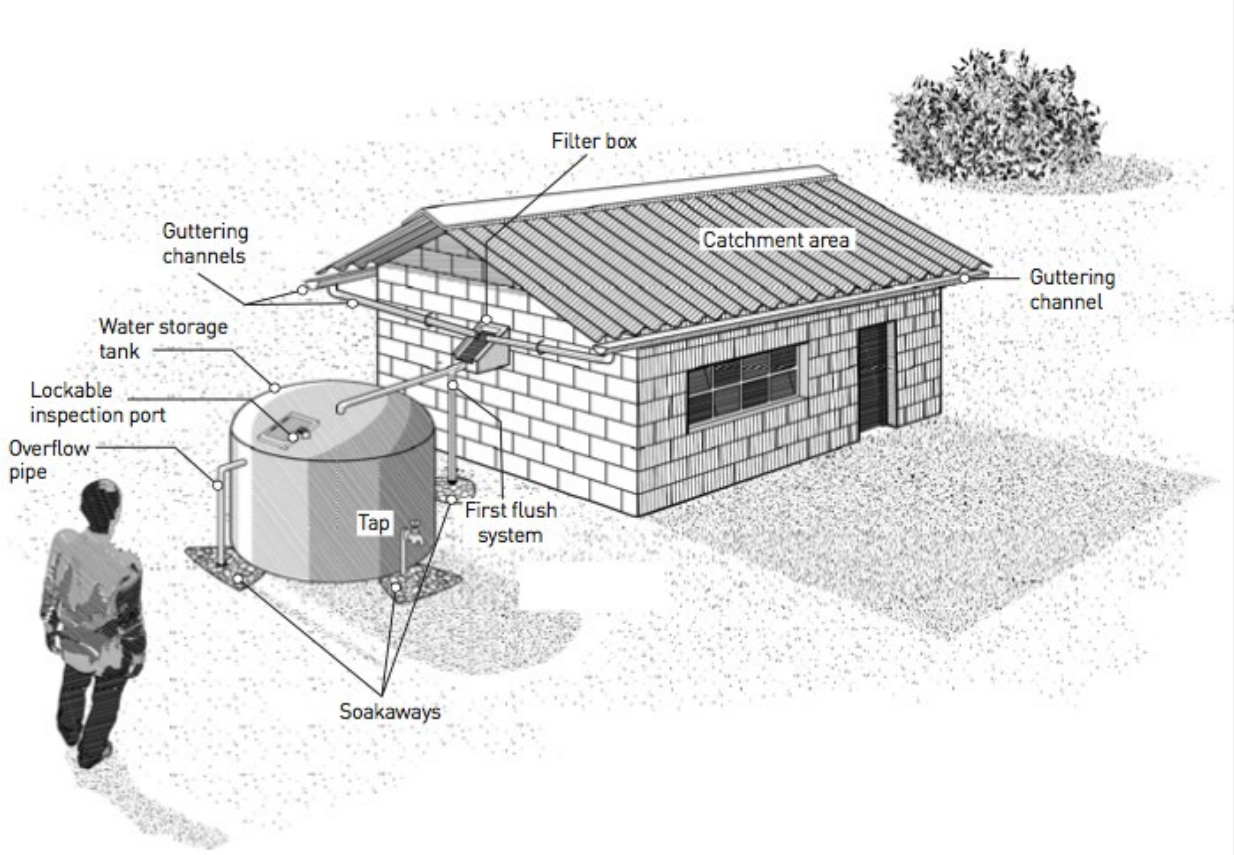
Filter box or filter is a coarse/mesh filter that protects large debris from entering the storage tank.

First flush systems are used for storage of drinking water, and reduce the potential for contamination by re-directing the first water to fall on the roof away from the tank. This is important as the first water washes off contamination on the roof. A picture diagram is provided to explain more.

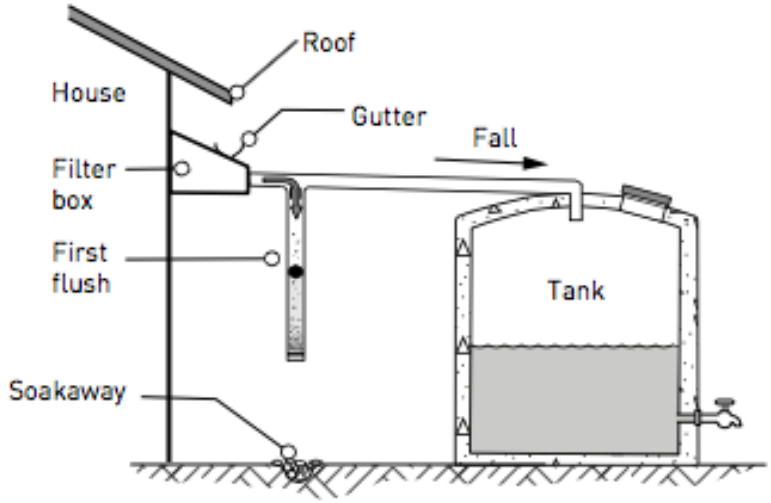
Water storage tanks can be Polythene (plastic), concrete, cement mortar, or ferro-cement. Most water storage tanks have an overflow pipe that prevents water from overfilling.

Soakaway pits are a defined drainage area to prevent water from collecting or pooling at the collection area.

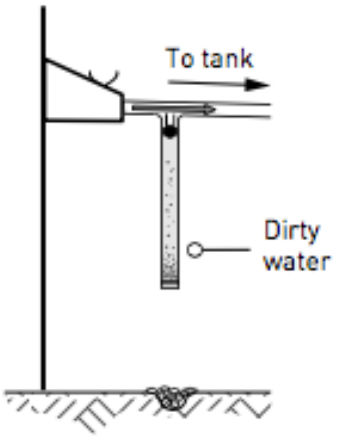
Parts of a Rainwater Harvesting System:



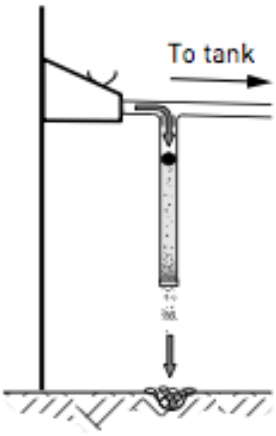
How First Flush Devices Work:



a: The first flow of captured rainwater and any suspended debris enter the sump rather than the tank.



b: Later flows, which should contain much less debris, pass into the tank because the sump is full. A ball valve should be in place to prevent any carry over of water from the sump to the tank once the sump is full.



c: An automatic drainage valve cleans out the water and sediment in the sump preparing it for the next rainfall event.

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Common Operation and Maintenance Problems, Causes, and Solutions for Rain Tanks

Common Problems	Causes	Solutions
1. Missing gutters	• Lack of funds • Poor quality gutters that fell off roof	• Provide funds and build new gutters
2. Rusty or hanging gutters	• Dirty/dusty gutters, poor quality • Negligence	• Clean the gutters regularly • Provide regular maintenance to the gutters
3. Filter is missing or broken	• Not installed originally • Normal wear and tear	• Create a new coarse/mesh filter (e.g., use chicken wire)
4. First flush is absent or not being emptied	• No first flush installed with the system • First flush device is clogged and not draining because of debris from the roof	• Install coarse filter to prevent clogging from large items • Clean and empty first flush device
5. Visible contamination in storage tank	• There is no filter or first flush device • First flush device not working properly	• Replace or repair filter and first flush device • Drain, clean, and disinfect the storage tank
6. Leaking tank	• Wear and tear	• Repair leaking tanks
7. Leaking taps	• Careless handling • Poor quality taps	• Handle the taps gently • Train users on proper use and handling • Replace leaking taps
8. Cracked platform	• Wear and tear	• Repair cracks and any masonry work
9. Flooded collection point	• Lack of or poorly maintained soak pit	• Provide soak pit for waste water

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Maintenance Plan for Rainwater Harvesting Systems

	Observation	Resulting Action	Person(s) Responsible
Daily	Standard item to do after each rain event	Empty the first flush device. Check that the weep hole isn't plugged. Close the first flush device tightly.	
Monthly	Check for cracking and/or structural issues in brick masonry	If surface crack(s) present, repair using cement mortar	
		If major crack(s) present, call technician to repair	
	Check for leaks in all parts of the rainwater harvesting system (taps, valves, tank, etc.)	Tighten or replace leaky fittings. Call a technician for assistance as necessary.	
	Check actual collected maintenance funds and compare to planned funds	Facilitate the monthly O&M collections from students, and adjust amounts if necessary	
At End of Each Dry Season	Check gutters for low spots or damaged sections	Adjust or repair gutters as necessary	
	Check for debris in mesh filters	Clean and rinse mesh filters	
	Standard items to do each end of dry season	Sweep and rinse roof	
		Sweep and rinse gutters	
		Flush out downspout(s) and clean out first flush device	
		Scrub inside walls and floor of tank	
		Prepare bleach solution in three 20-liter jerry cans	
		Use broom to "paint" inside of tank with solution (**Hazard:** do not enter tank during process)	
		Rinse inside of tank with clean water	
		Open drainage outlet to flush out sediment. Continue flushing/rinsing until tank is clean. Close drainage outlet.	
		Close and secure hatch	

Lesson 4: Motorized Pumping Systems

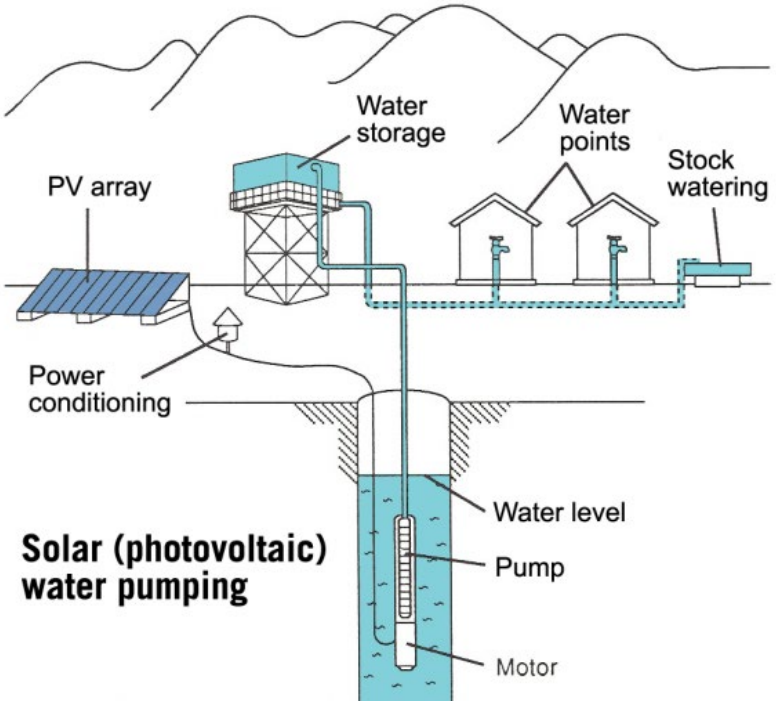

Image citation: *Practical Action*. https://practicalaction.org/solar-powered-water-pumps Accessed on June 14, 2019

Key Messages

Motorized pumping systems use electricity to extract water out of the ground. Multiple areas such as the solar panels (or electricity source), storage tank, and water collection points need regular maintenance for motorized pumping systems to function correctly.

Lesson Content

A motorized pumping system replaces a hand-powered pump with a motorized pump and powered by electricity to extract water from the ground.

Some common sources of electricity for the pump are solar panels (as pictured), the electrical grid, or a diesel generator.

Water is pumped using a motor from the water source typically to an elevated water storage tank.
A float switch is usually installed in the water storage tank and signals the pump to turn on when the tank is low and off when the tank is full

Water travels from the storage tank to water collection points through distribution pipes.

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Common Operation and Maintenance Problems for Motorized Pumping Systems

Common Problems	Causes	Solutions
1. System not pumping water	• Worn out parts • Broken components or controls • Lack of spare parts • Use of poor-quality parts • Lack of preventive maintenance • Lack of a pump mechanic to make repairs	• Repair or replace broken parts • Perform preventative maintenance • Perform regular maintenance • Only use high-quality replacement parts and trustworthy pump mechanics
2. Broken or stolen solar panels (if applicable)	• Lack of anti-theft measures • Children playing near equipment / throwing rocks • Destruction by storms or natural accidents	• Panels should be well secured and protected to discourage theft • Children should avoid playing near the panels that may result in damaging of the facility • Panels should be properly secured and installed away from trees
3. Broken taps on storage tank or tap stand	• Users not being cautious when using a tap • Poor quality materials	• Replace tap • Use high quality materials • Teach proper use of taps
4. Cracks or breaks in storage tank	• Poor quality construction or materials • Not repairing soon after problem is identified (problem gets worse) • Not protecting plastic tanks from sunlight	• Repair any cracks on any part of the tank • Use proper construction materials & methods • Protect plastic tanks from sunlight with a roof or by painting
5. Low or no water pressure at water collection points	• Broken or leaking distribution pipes • No water in the storage tank • Tap or valve stuck or left open	• Repair or replace distribution piping • Ensure water is being pumped to the tank • Ensure no valve or tap is unintentionally left open
6. Collection point flooded with water	• No sink or concrete pad • Clogged drainage channel or soak pit • Poor workmanship • Tap or valve stuck or left open	• Clear the drainage area of debris • Rehabilitate soak pit • Proper construction of water collection area • Ensure all taps are not unknowingly discharging water
7. Lack of fence around source or broken fence	• Lack of awareness about importance of a fence around the source	• Provide/mend the fence around source • Set an operation and maintenance plan

	• Lack of budget or operation and maintenance plan • Children playing at source / removing fence	• Children should avoid playing at the source that may result in damaging of the facility

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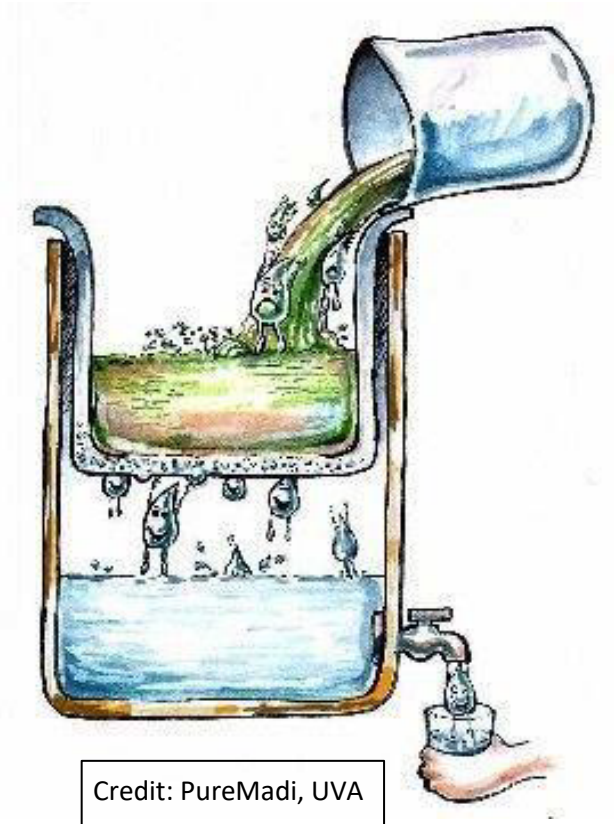
Maintenance Plan for Motorized Pumping Systems

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for low or no water pressure at water collection point	If the tank has water in it, check distribution piping for leaks or breaks	
		If the tank is empty, call technician to repair pumping system	
	Check for new signs of standing water or wet soil near buried pipes	Replace broken or leaking distribution piping	
	Check for rubbish, overgrown vegetation, and OD near the water point	Clean up rubbish and OD, and trim vegetation	
Monthly	Check all fittings for leakage	Tighten or replace fittings as needed to stop leakage	
	Check for cracks or breaks in the water storage tank	Call a technician immediately if there are any signs of existing or imminent cracks	
	Check for breaks in the fence that allow livestock to enter	Repair any broken fencing	
	Check for changes in the taste, color, and/or odor of the water	Call a technician if there is major change (possible contamination)	
	Check for accessibility issues (e.g. locked pump, landowner issues, crumbling stairs, etc.)	Negotiate with Water Committee, landowners, and users to resolve any access issues. Call a technician to repair any broken infrastructure affecting access.	
Yearly	Standard items to do every year	Wash solar panels (if applicable)	
		Empty and clean inside of water storage tank	

Lesson 5: Water Filters



Credit: PureMadi, UVA

Key Messages

Water filters are used to clean water that comes from an unsafe or unprotected source. It is important to keep water filters clean to make sure they function as they are supposed to.

Lesson Content

Water filters are used to clean water when the source itself is not protected or safe.

The ceramic insert can hold about 8-10 liters of water and sits inside a plastic receptacle that holds water that has passed through the filtration system until the water is accessed through a spigot.

Filters can be purchased from local vendors or in larger cities.

A filter should last for about 3 years if unbroken, but can be replaced at a minimal cost if necessary.

As water is poured into the ceramic insert, it will slowly percolate through small holes and help remove living organisms, dirt and sediment, and bacteria.

Contaminants are removed because the small holes are very intricate pathways causing the particles to get stuck and stay in the ceramic material.

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Common Operation and Maintenance Problems for Water Filters

Common Problems	Causes	Solutions
1. Broken ceramic filter insert	• Normal wear and tear • Improper installation • Dropped while cleaning	• Purchase new ceramic insert • Keep spare ceramic inserts in storage and available for replacement
2. Flow is reduced to less than 1-3 liters per hour	• Normal wear and tear—needs regular cleaning, especially after filtering turbid water	• See table below

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Maintenance Plan for Water Filters

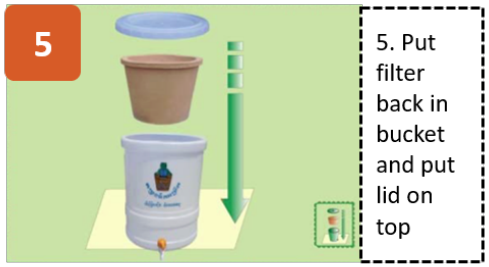
How to keep a water filter clean

1. Remove filter

2. Rinse filter with clean water

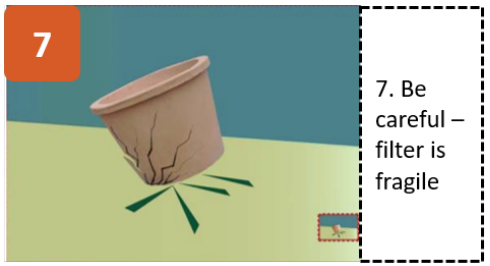
3. Do not wash filter with soap

4. Wash bucket with soap and clean water



5. Put filter back in bucket and put lid on top

6. Store filter next to clean water cups

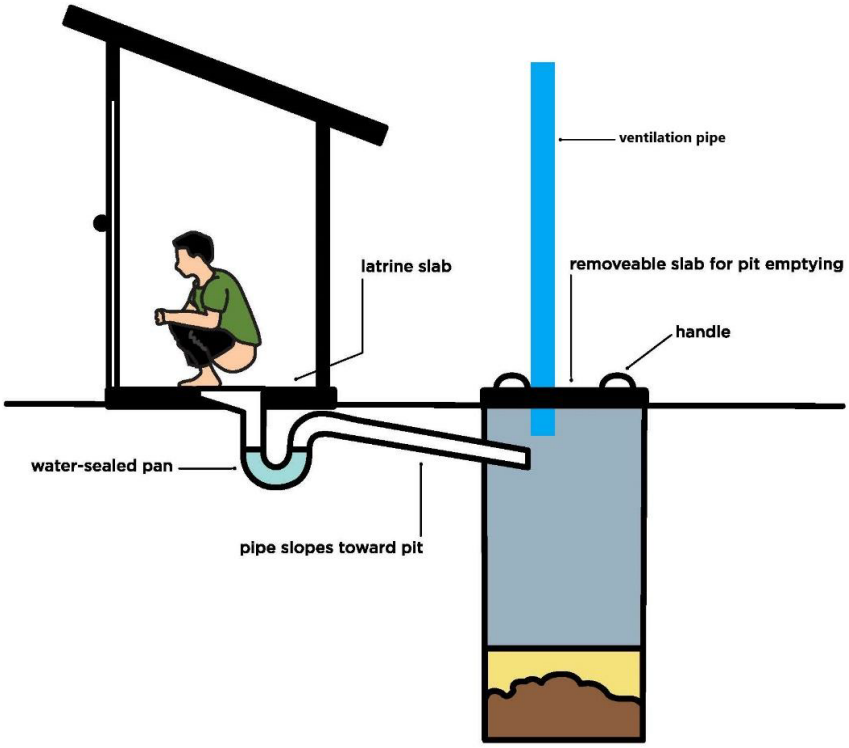


7. Be careful – filter is fragile

8. Be careful – do not touch faucet, filter, or inside bucket

9. Be careful – keep lid on filter to keep out insects

Lesson 6: Pour-Flush Latrines



Key Messages

Pour-flush latrines are a latrine system drained by pouring 2-3 liters of water into the pit. These latrines require special attention to keep them functioning properly for those who use them, including daily observation and hiring professionals to empty the pit every 1-4 years.

Lesson Content

Pour-flush latrines require a special pan which contains a water seal.

Because of this bend in the pipe, 2-3 liters of water are required to flush excreta through the seal into the pit—the amount of water required may increase if the pit is offset.

Pipes connect the water seal with an offset pit which can be made from various materials including: plastic, fired clay or asbestos cement.

Pipes should be smooth and straight, as roughness or curves may lead to blockage.

Pour-flush latrines generally have a reduced odor and thus reduce fly activity making them an attractive option but it is imperative that water is available for flushing.

The vent pipe aids the foul, warm air to rise and is withdrawn from the pit by the movement of wind across the upper end of the pipe of wind across the upper end of the pipe.

The latrine block can either have a urinal for boys or a changing room / washroom for girls. Handwashing facilities are located as part of the latrine block, or within 10 meters of the latrine.

Operational Considerations for Pour-Flush Latrines

Latrines are only effective if all staffs and pupils use them whenever needed. The latrines must give the users sufficient privacy and protection against the weather. Girls need their own latrines to feel safe and comfortable. Their latrines must be seen from the classrooms. If the school has such proper latrines, all boys and girls will be encouraged to always attend the school.

The cleaning of the latrines should be the responsibility of the users themselves, not just the cleaners. For instance, pupils from higher classes can be made responsible to clean the latrines in shifts. Even contests can be organised to award the class/team doing the best job. Within the class, the tasks can be divided over the week among teams of boy and girl pupils. They are also responsible to daily lock and unlock the latrines. Leaving the doors unlocked during the night may invite outsiders to soil or incorrectly use the latrines. Pupils and/or the School WASH Club should look after the hand-washing facilities, i.e. cleaning the site, making sure there is sufficient water and soap (or ash), and make sure the drainage works properly.

Pour-Flush latrines need special care as objects thrown into the latrine (e.g., cotton, sanitary napkins, rocks, or rubbish), can prevent the latrine pipes from draining correctly. It is very important to teach this to all people using the latrine.

Pour-Flush latrines will need to be emptied by a professional every 1 – 4 years (depending on use). Best is 24 months as then most sludge will be decomposed. It is recommended to do the emptying activity just a few days before the school year will start again (it is even best if this aligns with the dry season). As no new excreta has flown in into the pit for some weeks, the sludge will look more composed and stabilized. **NOTE**: Use of A Professional Emptying Team Is strongly advised (Using a Cesspool Emptier or Gulper System)

Regular maintenance will help the latrine to stay in good condition. This includes whitewashing the inside of the latrine, and also painting or varnishing the door annually. All door hinges should also be greased each term.

Lifewater

Common Operation and Maintenance Problems, Causes, and Solutions for Pour-Flush Latrines

Common Problems	Causes	Solutions
1. Objects thrown in pit that should not be (e.g., stones, cotton, sanitary napkins)	• Lack of understanding of how pour-flush latrines work • No waste baskets • No options for anal cleansing	• Teach how pour-flush latrines work • Put up signs to prevent throwing of objects into latrine pit • Provide toilet paper or water for anal cleansing • Provide waste baskets and regular schedule for emptying them
2. Excess smell or uncleanliness	• Students not using latrine properly (urine or feces on floor / walls) • There are accidents (small children or someone with illness) and no cleaning is done • The latrines are never cleaned	• Teach proper use of latrines to all students • Create regular cleaning schedule
3. Excess light in the latrine attracts flies from the pit latrine	• Poor designs and construction of pour-flush latrines • Lack of preventive maintenance system • Broken doors and shutters • Broken seal in the pan	• Carry out proper maintenance of door shutters and vents • Use good quality construction materials • Ensure that doors are closed all the time to minimize the amount of light in the VIP latrines to reduce attraction of flies • Ensure that all vents have wire mesh • Use disinfectants for cleaning
4. Broken doors or shutters	• Poor quality of building materials • Vandalism by pupils/school community • Lack of preventive maintenance system	• Use good quality materials • Proper supervision during construction • Carry out proper maintenance of door shutters • Lock the latrines when the school closes for holidays

5. Broken vent pipes	• Poor designs and construction • Damage of the pipes • Lack of preventive maintenance system • Poor quality of pipes • Excessive heat	• Provide proper maintenance of pipes • Use good quality building materials • Check the pipes regularly • Replace broken pipes • Carry out preventive maintenance • Prevent pupils not to play around with the pipes
6. Pit is full	• Pit has not been regularly checked for sludge depth • Plans were not made in advance for funds needed for emptying – either with government or by school administration / PTA • Preparations have not been made to do emptying	• Make regular schedule to check sludge depth (end of school term or monthly) • Create plan to collect funds for emptying school latrines or coordinate with government • Identify company that can do emptying *before* it is needed

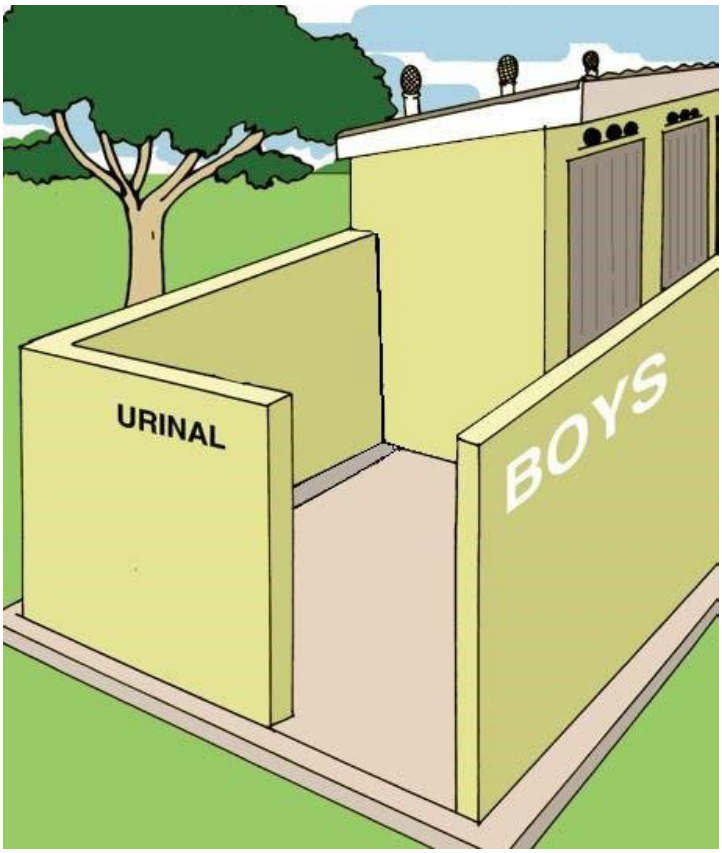
Lifewater

Maintenance Plan for Pour-Flush Latrines

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for debris or blockages in urinals and drop holes	Remove debris and blockages	
	Check that all stance doors can close	Close doors and remind teachers/students	
	Check the overall cleanliness of the latrine (in and out) in the morning and evening	Sweep/wash floors and clean walls as necessary; empty sanitary bucket in washroom if present	
	Check for presence of soap or ash at the handwashing station	Add soap or ash as needed	
	Check for presence of water in the handwashing tank (and washroom tank, if separate)	Refill the tank(s) as needed	
	Manage assignment and completion checks of maintenance tasks	Make decisions and prepare weekly plan	
	Check that there is enough water for anal cleansing or flushing	If there is not enough water available, refill the receptacle If the tank is empty, call technician to repair pumping system	
Monthly	Check for cracking and/or structural issues in walls, slab, stairs, and ramps	If surface crack(s) present, repair using cement mortar	
		If major crack(s) present, call technician to repair	
	Check door hinges for rust or wear	If minor, grease hinges. If major, replace hinges	
	Check for leaks in all parts of the rainwater harvesting system (taps, valves, etc.)	Tighten or replace leaky fittings. Call a technician for assistance as necessary.	
	Check actual collected maintenance funds and compare to planned funds	Facilitate the monthly O&M collections from students, and adjust amounts if necessary	

	Check sludge level in pits at the end of each school term	Empty pits when sludge reaches designed maximum level (or before)	
Seasonally	If there is a rain tank, standard items to do each end of dry season	Sweep and rinse roof surfaces where rainwater is collected	
		Sweep and rinse gutters	
		Flush out downspout(s) and clean out first flush device	
		Scrub inside walls and floor of handwashing and washroom rain tank(s)	
		Prepare bleach solution in 20-liter jerry cans and wipe down inside of rain tank(s)	
		Rinse inside of tank(s) with clean water	
		Open drainage outlet(s) to flush out sediment collected at bottom. Continue flushing/rinsing until each tank is clean. Close drainage outlet(s).	
		Close and secure hatches	
Annually	Standard item to do annually	Whitewashing inside of latrine	
		Paint or varnish latrine doors (depending on type)	
		Grease door hinges	

Lesson 7: Urinals



Key Messages

Urinals are sanitation facilities meant to be used by boys for the disposal of urine, which drains either to a soak pit or to the main pit.

Lesson Content

A urinal is a sanitation facility for the safe disposal of urine. These are often constructed for boys as part of a latrine block. It has a channel for draining the urine.

The urine can drain to either a soak pit or to the main pit.

Common Operation and Maintenance Problems, Causes, and Solutions for Urinals

Common Problems	Causes	Solutions
1. Blockages of drainage channels	• Waste paper, leaves, or silt accumulation on the channel • Negligence in regular cleaning • Lack of understanding of proper use	• Regular cleaning to remove all substances deposited in the drainage channel • Proper maintenance of the runoff water channel around to prevent silting • Educating on proper use of the urinal • Consider locking or closing during school holidays
2. Smell/Odor	• Lack of regular flushing with water • Accumulation of organic components of urine on the urinal surfaces and in the cracks in the slab and channel • Lack of or non-functional soak pits for disposal of urine • Irregular washing with detergents	• Clean the urinal with water using a soft brush at noon and water with detergent after classes. • Regular scrubbing with water and detergents • Seal cracks in the urinal diversion channel immediately after they are discovered • Provide a soak pit and ensure its functionality (i.e. not blocked) • Pour crushed charcoal in the urinal diversion channel • Urinate in the urine diversion channel
3. Clogged/blocked soak pit	• Accumulation of silt and debris • Delayed repair/maintenance of the soak • Poor workmanship	• Ensure presence of a grating to sieve debris before it drains down the pipe • Uncover the soak pit, clean the stones and leave the pit to dry before putting back the stones • Cover the soak pit with impervious materials • Remove the sieve over the drainpipe and insert a flexible, thin bamboo stick to push the blockage through. This can also be done from the soak-away end.

Maintenance Plan on page 49

Lesson 8: Changing Room/Washroom

Key Messages

Washrooms are facilities intended for girls to use to promote safety, dignity, and comfort while experiencing menstrual periods. Things required in a washroom include a basin, water, soap, a hook to hang clothes off the floor, and a rubbish bin.

Lesson Content

Wash rooms are facilities provided at the girls' latrines to promote girls' hygiene, particularly during menstrual periods.

These can be a part of a larger stance or as a separate room.

This changing room should have a basin, water, and soap so that a girl can clean herself or clothing as need. There should be a drainage hole so water can drain to a soak pit.

The changing room should also have a hook to hang clothes off of the floor.

The changing room should have a rubbish bin.

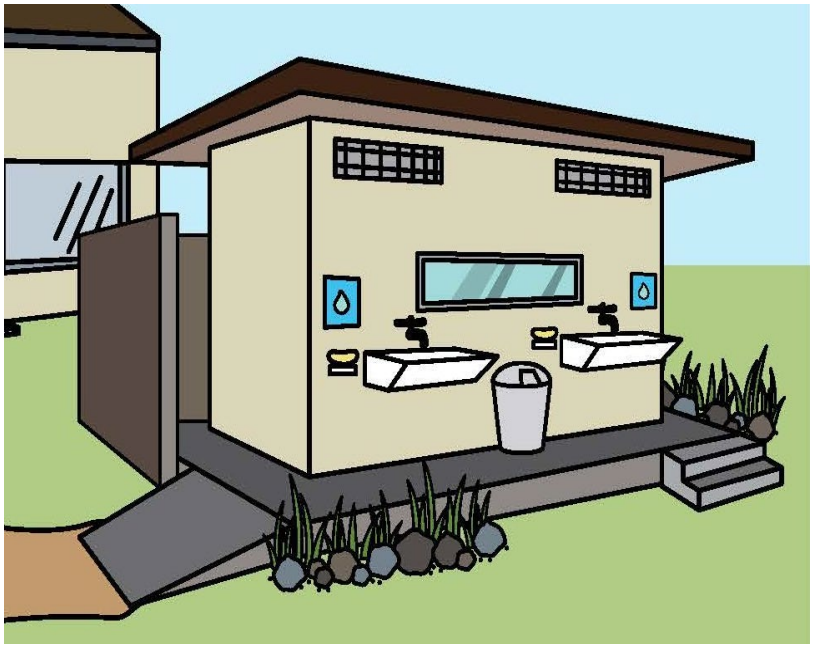
Lifewater

Common Operation and Maintenance Problems, Causes, and Solutions for Washroom / Changing Room

Common Problems	Causes	Solutions
1. Blockages of the drainage system	• Depositing of materials on floor that should be put in rubbish bin. (e.g., waste paper or disposable menstrual pads) • Lack of regular cleaning • Accumulation of silt and debris	• Display notices about where rubbish should be put and what can go down the drain • Provide education and training on use • Regular cleaning of the washroom and the drainage system
2. Clogged soak pits	• Accumulation of silt and other debris	• Regular cleaning of the washroom and the drainage system
3. Broken doors	• Bad handling • Poor preventive maintenance • Poor workmanship • Lack of proper school compound fence and gate	• Regular monitoring • Preventive maintenance • Health education on proper handling • Supervision of construction work • Making sure that the school has lockable gate and is well fenced
4. Lack of sanitary waste bin for used sanitary pads	• Lack of commitment by school authorities • Inadequate funds to support routine maintenance • Lack of understanding of importance	• Provide the sanitary waste bins in all washrooms • Provide affordable self-opening and closing bins • Build small house (incinerator) next to washrooms for pads if disposable pads are being used

Maintenance Plan on page 49

Lesson 9: Handwashing Facility Maintenance



Key Messages

It is important to have properly functioning handwashing facilities near latrine to encourage handwashing after using the latrine. For proper sanitation, handwashing facilities need to be stocked with soap or ash, have sufficient water for the taps to flow, and be regularly maintained and monitored.

Lesson Content

A Hand Washing Facility (HWF) is a water container of an appropriate design and capacity for hand washing with a tap.

It should be positioned close and convenient to facilitate hand washing with soap or ash after using the latrine. It should either be attached to the latrine block or less than 10 meters from the latrine.

Additional handwashing stations or tippy taps can be installed at strategic locations to promote handwashing before handling or eating food.

A soak pit or drainage channel helps to prevent pooling of water or mud on the ground.

Lifewater

Common Operation and Maintenance Problems, Causes, and Solutions for Handwashing Stations

Common Problems	Causes	Solutions
1. Leaking containers	• Poor handling and storage • Lack of preventive maintenance • Weak containers	• Regular cleaning to prevent corrosion by removing sediments • Use of good quality containers • Repairs leaking parts • Improve storage methods to prevent damage
2. Empty containers	• Lack of water at the school • Negligence • Leakages • Lack of an effective mechanism to refill containers (e.g., no roster for pupils to fill or no piped system or not enough rain)	• Collect water from all the available water sources • Assign a person(s) to be responsible for refilling • Repair leakages • Use of good quality containers • Make sure taps are turned off when not in use and are not leaking.
3. Broken taps	• Poor handling • Lack of preventive mechanism • Weak taps	• Monitor regularly the usage of taps • Educate the users on proper usage
4. Poor drainage of waste water	• Lack of drainage system & soak pit • Poor maintenance • Lack knowledge	• Provide an effective waste water drainage system with soak pit • Carry out preventive maintenance
5. Vandalism	• Lack of effective security system • Undisciplined pupils & other persons	• Provide an effective & efficient security mechanism • Regular and effective monitoring • Train students on proper use
6. Lack of soap	• Negligence • Lack of prioritization for provision of soap • Lack of optional detergents like liquid soap	• Create awareness among all stakeholders of soap for hand washing • Create school plan to make sure that soap or liquid soap is available at all times

7. Improper utilization, loss or misplacement of water container covers	• Negligence • Wear and tear • Lack of awareness	• Regular monitoring and sensitization • Replacement of worn-out covers • Painting anti-rust regularly
8. Dirty containers	• Lack of cleaning/washing • Negligence	• Assign a person(s) to be responsible for washing the containers on a regular basis • Assign different class students and check regularly
9. Water left running to waste	• Lack of knowledge to operate taps • Lack of understand of impact (loss of all water) • Negligence and carelessness • Small children	• Train users of the taps • Regular monitoring and sensitize • Assist/train small children

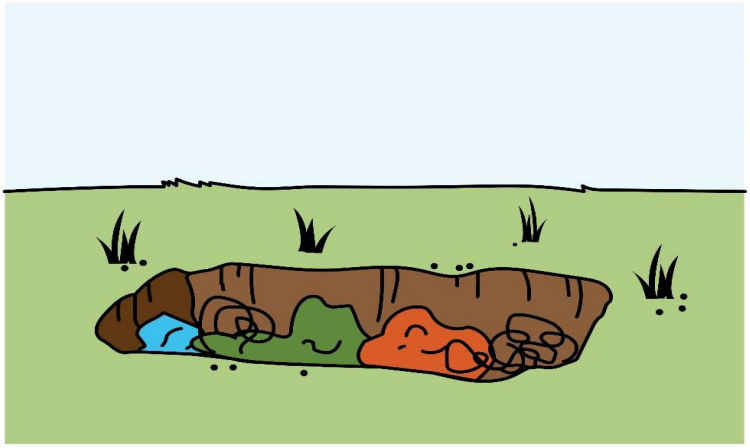
Lifewater

Maintenance Plan for Latrine, Urinal, Changing Room, and Handwashing Station

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for debris or blockages in urinals and drop holes	Remove debris and blockages	
	Check that all stance doors can close	Close doors and remind teachers/students	
	Check the overall cleanliness of the latrine (in and out) in the morning and evening	Sweep/wash floors and clean walls as necessary; empty sanitary bucket in washroom if present	
	Check for presence of soap or ash at the handwashing station	Add soap or ash as needed	
	Check for presence of water in the handwashing tank (and washroom tank, if separate)	Refill the tank(s) as needed	
	Manage assignment and completion checks of maintenance tasks	Make decisions and prepare weekly plan	
	Check that there is enough water for anal cleansing or flushing	If there is not enough water available, refill the receptacle If the tank is empty, call technician to repair pumping system	
Monthly	Check for cracking and/or structural issues in walls, slab, stairs, and ramps	If surface crack(s) present, repair using cement mortar	
		If major crack(s) present, call technician to repair	
	Check door hinges for rust or wear	If minor, grease hinges. If major, replace hinges	
	Check for leaks in all parts of the rainwater harvesting system (taps, valves, etc.)	Tighten or replace leaky fittings. Call a technician for assistance as necessary.	
	Check actual collected maintenance funds and compare to planned funds	Facilitate the monthly O&M collections from students, and adjust amounts if necessary	

	Check sludge level in pits at the end of each school term	Empty pits when sludge reaches designed maximum level (or before)	
Seasonally	If there is a rain tank, standard items to do each end of dry season	Sweep and rinse roof surfaces where rainwater is collected	
		Sweep and rinse gutters	
		Flush out downspout(s) and clean out first flush device	
		Scrub inside walls and floor of handwashing and washroom rain tank(s)	
		Prepare bleach solution in 20-liter jerry cans and wipe down inside of rain tank(s)	
		Rinse inside of tank(s) with clean water	
		Open drainage outlet(s) to flush out sediment collected at bottom. Continue flushing/rinsing until each tank is clean. Close drainage outlet(s).	
		Close and secure hatches	
Annually	Standard item to do annually	Whitewashing inside of latrine	
		Paint or varnish latrine doors (depending on type)	
		Grease door hinges	

Lesson 10: Rubbish Pits



Key Messages

Rubbish pits are a place to dispose of trash away from people. Rubbish should be periodically burned so that the pit does not overflow.

Lesson Content

Rubbish pits are an easy-to-build facility to dispose of rubbish and plastics from the compound.

It should be located away from areas students congregate or play to reduce the risk of injury or smell

By sweeping and dumping rubbish into a pit, compounds are more beautiful, smell better and make learning more enjoyable for students.

Rubbish should be periodically burned so that the amount of waste does not overflow the edges of the pit

Lifewater

Maintenance Plan for Rubbish Pits

	Observation	Resulting Action	Person(s) Responsible
Daily	Check for rubbish around compound	Clean up all rubbish, OD and trim vegetation.	
Monthly	Check to make sure rubbish pit has not overflowed	Conduct an adult-supervised burn to “empty” the pit.	
Yearly	Check to make sure pit walls are still strong and have not eroded	Use a shovel and strengthen walls by digging or repairing parts that have eroded.	

Appendix

Use the following appendices as an example of how to calculate the costs of regular school water and sanitation infrastructure maintenance.

Lifewater

Appendix A: Tariff Tools: Uganda India Mark II Pump

Updated 2018

India Mark II (Borehole or Hand-dug Well) Tariff Calculations

Well Pump Parts	Frequency for Replacement	Price per Year (UGX)										Total Estimated Cost for 10 Years
		1	2	3	4	5	6	7	8	9	10	
Pump buckets (pair)	6 months - 1 year	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	100,000
Chain with coupling, nut, and bolt	1 year - 2 years		35,000		35,000		35,000		35,000		35,000	175,000
Axle bearing (Ball bearing)	6 months - 1 year	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	100,000
Piston valve rubber	6 months - 1 year	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	80,000
Foot valve rubber	6 months - 1 year	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	50,000
Handle axle with washer and nut	2 years - 5 years				25,000				25,000			50,000
O-ring seal	6 months - 1 year	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	55,000
Hand pump cylinder (Normal)**	2 years -10 years								160,000			160,000
Upper valve complete	1 year - 2 years		38,000		38,000		38,000		38,000		38,000	190,000
Foot valve	1 year - 2 years		35,000		35,000		35,000		35,000		35,000	175,000
Connecting Rods (SS)*	4 years - 10 years				200,000						400,000	600,000
Riser pipes (PPR)*	4 years - 10 years				140,000						260,000	400,000
Apron & drainage repair	5 years -10 years									850,000		850,000
Pump head with spacer	5 years -10 years								300,000			300,000
Water tank	5 years - 10 years								120,000			120,000
Handle	3 years - 10 years							180,000				180,000
Front cover with bolt	3 years - 10 years							53,500				53,500
Disinfection	Each time well is opened	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	300,000
Mechanic / Technician Fee per visit	UGX 25,000 / visit, 2 visits annually	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	500,000
Total for Year (UGX)		118,500	226,500	118,500	591,500	118,500	226,500	352,000	831,500	968,500	886,500	**4,438,500**

* Both Connecting Rods and Riser Pipe include 2 lengths being replaced at 4 years in case of problems, with an additional 4 lengths at 10 years. Deeper wells will require more.

Tariffs: Total Water Point Tariff (10 year Average)

Average Annual Tariff (1 time per year)	443,850
Average Semi-annual Tariff (2 times per year)	221,925
Average Term Tariff (3 times per year)	147,950

Instructions: Select the tariff frequency (annual / 2 times per year / term) for the water point

Tariff Tool: Calculate Per Household Tariff

	/		=	
Water Point Tariff		Total # of Students		Student Tariff

Instructions: To determine tariff per student enter the total water point tariff and divide by the number of households

Lifewater

Appendix B: Tariff Tools: Uganda Rainwater Tank

Updated 2018

Rain Tank Water Tariff Calculations

Rain Tank Parts	Frequency for Replacement	Price per Year (UGX)										Total Estimated Cost for 10 Years
		1	2	3	4	5	6	7	8	9	10	
Tap / Faucet	6 months	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	600,000
Disinfection	6 months	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000
Gutter fixing	2 years		100,000					100,000				200,000
Gutter replacement	5 years					360,000					360,000	720,000
Piping	7 years							750,000				750,000
Cement / surface repairs	3 years			300,000			300,000			300,000		900,000
Mechanic / Technician Fee per visit	UGX 25,000 / visit, 2 visits annually	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	500,000
Total for Year (UGX)		210,000	310,000	510,000	210,000	570,000	510,000	1,060,000	210,000	510,000	570,000	**4,670,000**

Tariff: Total Water Point Tariff (10 years Average)	
Average Annual Tariff (1 time per year)	467,000
Average Semi-annual Tariff (2 times per year)	233,500
Average Term Tariff (3 times per year)	155,667

Instructions: Select the tariff frequency (annual / 2 times per year / term) for the water point

Tariff Tool: Calculate Per Household Tariff

	/		=	
Water Point Tariff		Total # of Students		Student Tariff

Instructions: To determine tariff per student enter the total water point tariff and divide by the number of households

Lifewater

Appendix C: Tariff Tools: Ethiopia Afridev Pump

Updated 2018

Afridev Pump (Hand-Dug Well or Borehole) Water tariff Calculations

Well Pump Parts	Frequency for Replacement	Price per Year (ETB)										Total Estimated Cost for 10 Years
		1	2	3	4	5	6	7	8	9	10	
U Seal	2 years		115		115		115		115		115	575
O ring	2 years		90		90		90		90		90	450
Bush Bearing	3 years			60			60			60		180
Rod Centralizer	4 years				35				35			70
Bobbin	4 years				150				150			300
Fulcrum Pin	4 years				700				700			1,400
Botls & Nuts	3 years			90			90			90		270
Hand pump cylinder	5 years					4,200					4,200	8,400
Foot valve	5 years					560					560	1,120
Plunger valve	5 years					510					510	1,020
Aprong and drainage repairs	5 years					420					420	840
PVC pipe & centralizer	5 years					1,020					1,020	2,040
Disinfection	Each time well opened		480	480	480	480	480		480	480	480	3,840
Mechanic / Technician Fee per visit	ETB 300 per visit, 2 visits per year	600	600	600	600	600	600	600	600	600	600	6,000
Total for Year (ETB)		600	1,285	1,230	2,170	7,790	1,435	600	2,170	1,230	7,995	**26,505**

* PVC pipe and centralizer is estimated at 340 ETB per 15 meters depth, and for 45 meter well. For wells more shallow or more deep, calculations can be modified

Tariff: Total Water Point Tariff (10 years Average)

Average Annual Tariff (1 time per year)	2,651
Average Semi-annual Tariff (2 times per year)	1,325
Average Term Tariff (3 times per year)	221

Instructions: Select the tariff frequency (annual / 2 times per year / monthly) for the water point

Tariff Tool: Calculate Per Household Tariff

	/		=	
Water Point Tariff		Total # of Students		Student Tariff

Instructions: To determine tariff per student enter the total water point tariff and divide by the number of students

Lifewater

Appendix D: Tariff Tools: Ethiopia Protected Spring

Updated 2018

Protected Spring Water Tariff Calculations

Protected Spring Parts	Frequency for Replacement	Price per Year (ETB)										Total Estimated Cost for 10 Years
		1	2	3	4	5	6	7	8	9	10	
Various Fittings (tap, faucet, gate valves, nippes, etc.)	1 year	300	300	300	300	300	300	300	300	300	300	3,000
Disinfection	1 year	300	300	300	300	300	300	300	300	300	300	3,000
Pipes repairing	5 years					430					430	860
Cement / surface repairs	5 years					2,800					2,800	5,600
Tank repair	5 years					28,000					28,000	56,000
Retaining wall repair	5 years					14,000					14,000	28,000
Pipes replacing	10 years										2,550	2,550
Mechanic / Technician Fee per visit	ETB 850 per visit, 1 visit per 5 years					850					850	1,700
Total for Year (ETB)		600	600	600	600	46,680	600	600	600	600	49,230	**100,710**

* Pipes are estimated at 85 ETB per 1 meters, and for 30 meters total. For protected springs with more piping, calculations can be modified

Tariff: Total Water Point Tariff (10 years Average)

Average Annual Tariff (1 time per year)	10,071
Average Semi-annual Tariff (2 times per year)	5,036
Average Term Tariff (3 times per year)	839

Instructions: Select the tariff frequency (annual / 2 times per year / term) for the water point

Tariff Tool: Calculate Per Household Tariff

	/		=	
Water Point Tariff		Total # of Students		Student Tariff

Instructions: To determine tariff per students enter the total water point tariff and divide by the number of students

Lifewater

Appendix E: Tariff Tools: Ethiopia Rainwater Tank

Updated 2018

Rainwater Tank Water Tariff Calculations

Rainwater Tank Parts	Frequency for Replacement	Price per Year (ETB)										Total Estimated Cost for 10 Years
		1	2	3	4	5	6	7	8	9	10	
Various Fittings (tap, faucet, gatevalves, etc.)	6 months	600	600	600	600	600	600	600	600	600	600	6,000
Gutter fixing	1 year	560	560	560	560	560	560	560	560	560	560	5,600
Disinfection	1 year	300	300	300	300	300	300	300	300	300	300	3,000
Cement / surface repairs	5 years					2,800					2,800	5,600
Painting the roof top	5 years					850					850	1,700
Gutter replacement*	10 years										25,200	25,200
												-
Mechanic / Technician Fee per visit	ETB 600 per visit, 1 visit per 5 years					600					600	1,200
												-
Total for Year (ETB)		1,460	1,460	1,460	1,460	5,710	1,460	1,460	1,460	1,460	30,910	**48,300**

* Gutters are estimated at 420 ETB per 1 meters, and for 60 meters total. For longer gutters, calculations can be modified

Tariff: Total Water Point Tariff (10 years Average)

Average Annual Tariff (1 time per year)	4,830
Average Semi-annual Tariff (2 times per year)	2,415
Average Monthly Tariff (3 times per year)	1,610

Instructions: Select the tariff frequency (annual / 2 times per year / term) for the water point

Tariff Tool: Calculate Per Household Tariff

	/		=	
Water Point Tariff		Total # of Students		Student Tariff

Instructions: To determine tariff per student enter the total water point tariff and divide by the number of students